# Food &c.

## 3.

## Vegetable Food.

## Water.

meat; (as, drying, smoking, salting, pickling, and canning) ~~a mode invented by a Frenchman~~

INJECTING SALT INTO THE BLOOD VESSELS

There has been within a few years a new method of pickling invented. Instead of soaking the animal in brine, by which means the salt enters from the outside, the following ~~plan~~ method, invented by Dr. Morgan of Dublin is employed. The breast of the animal is cut open and by means of the aorta, brine is injected into the blood vessels. There is no difficulty in this plan, either in theory or practice.

EF

AN ETABLE TANCES.

Leaving animal food, we now take up the vegetable substances. The most important ~~compds~~ vegetable aliments are the Cereal grains, viz. wheat, rye, corn, oats, &c. Wheat is the best. (As the proverb says "bread is the staff of life".) Wheat is the most nitrogenous. It has also carbon and ~~abundance~~ of starch. It contains from 10 to 15 per cent of gluten; (flour has .18) 60 to 75 per cent of starch

CEREAL GRAINS.

WHEAT

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Quality of flour: (Hinds & Howard)

best determined on baking; but should be white with a very light tinge of yellow; not lumpy — any lumps in it going away at once on pressure; not gritty, as that shows change in the starch-grains, (Housekeeping) & sourness is apt to result; when compressed in the hand, good flour will hold together & show the prints of the fingers longer than a poor article. When thrown against a wall, some should stick. Good flour makes an elastic dough, which may be drawn out long without breaking.

Whole wheat — & Moxie's "Cerealine"

(Hubbell's analysis) — By the ordinary pulverizing of the whitest flour separated from all of the bran, the highest priced superfine flour loses some of its most nutritious parts. Whole wheat makes stronger food.

"Wheat Phosphates" especially deficient in very white flour.

Imperial Granum — Selected flour: Nutrina & Papoma, roasted grain flour.

of salts, 50 phosph. acid, 35 potass; the soda, sulphuric and, silica, chl. sod, besides

1 to 4 per cent of sugar; and gum & salts.

BREAD.

In making bread, the fermentation of the sugar by yeast produces alcohol & carbonic acid which distend the gluten in the form of cellular spaces. The alcohol is immediately dissipated. In England, the difficult and expensive experiment of collecting the alcohol, was performed once on quite a large scale, without profit.

EXPERIMENT OF THE COLLECTING ALCOHOL.

INDIGESTIBILITY OF FRESH BREAD.

The indigestibility of fresh bread for weak stomachs, is well known. The reason seems to be that the gluten being adhesive does not allow the full action of the gastric juice. When the bread is stale it is crumbly, & allows of this action readily.

"PATENT, UNFERMENTED AERATED BREAD.

There are other ways of making bread. The most important is that of the "unfermented, aerated bread". Carbonic acid is injected into the dough mechanically. There is no objection to this, either in theory or practice. It ought to be economical, leaving all the sugar and starch unaltered. There is less disposition to get sour, for the same reason. It is very good bread & is used by hundreds in this city.

& + Liebig —

Horsford's: phosphoric acid & ?
bicarbonate of

* ^ In Chloroform — mineral particles sink, & flour will float. ~~Pure flour makes with alcohol a clear straw-colored solution, with an agreeable taste, whereas~~ ~~taste rather the vegetable or chemic adulterations.~~

\+ ^ also, barley, beans, peas, oatmeal, maize, rye, millet (Parkes) rice be, in some countries; little so here, I believe,

Potato meal makes the ashes of the flour, when burnt, alkaline, while solution of the bread is neutral (as it will not be if carbonate has been added). Pure flour makes with alcohol a clear straw-colored solution, with an agreeable taste.

*Death from the Inhalation of a mixture of Chloroform and Ether.* — Dr. E. LUDLOW records (*Med. Times and Gaz.*, Oct. 6, 1866) the following case in which death resulted from the inhalation of a mixture of one part chloroform to two parts of rectified ether.

ACTION OF CREAM OF TARTAR AND CARB. OF SODA.

Another way ... by the action ... carbonate of soda ... unites with the ... to rise. The ...

ROCHELLE SALTS.

the liability to excess of Rochelle salt being formed.

SALARATUS.

Saleratus is used also. But this has the same fault as the last. In New England, the bread often has a harsh, salty taste for this reason.

CARBONATE OF AMMONIA.

Carbonate of ammonia is sometimes used in making crackers, but it is too expensive to be employed much.

ADULTERATIONS OF FLOUR.

The adulterations of flour are numerous. Alum is used, to whiten it. A small amount of this innocent, but a large one will cause constipation of the bowels.

ALUM.

ITS TEST

The test for alum is chloride of barium.

CHALK.

GYPSUM.

Chalk, gypsum and lime are also used. The test for the latter is oxalate of ammonia.

POTATOES.

Ground potatoes are sometimes used. They are innocent but being less nu-

better resort is the bicarbonate of soda, baking soda, neutralized by the addition of muriatic acid, so as to convert it into table salt. The following procedure answers well: To every pound of flour or meal add 40 grains of baking soda, a pinch of salt, and a little sugar. Mix intimately. Then add 50 drops of muriatic acid in half a pint of water. Knead smartly and thoroughly. Divide into two rolls, and bake in a quick oven or on a hot plate with a cover.

Phosphoric acid & ?
Hydrochloric
bicarbonate of

* In Chloroform — mineral particles sink, & flour will float. ~~Pure flour makes with alcohol a clear straw-colored solution, with an agreeable taste, the flour tests rather the vegetable or organic adulterations.~~

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Potato-meal makes the ashes of the flour, when burnt, alkaline, while solution of the potato bread is neutral (as it will not be if carbonate has been added). Pure flour makes with alcohol a clear straw-colored solution, with an agreeable taste.

WATSON'S LECTURES 115
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THOMAS ON THE DISEASES
larged and Improved. With several hu
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PREPARING FOR
GALLOWAY'S QUALI

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*Bread made with Sea-water.*—M. Rabuteau calls attention to the importance of this article. In the first place it is very pleasant eating, also increasing the appetite and stimulating digestion. On board ship bread so prepared has been found very conducive to the preservation of health during long voyages. It also exerts important medicinal effects, especially in dyspepsia. In phthisis and in scrofula the author states it is a powerful adjuvant.—*Med. Times and Gaz.*, Feb. 3, 1872, from *L' Union Med.*, Jan. 6, 1872.

Horsford's: phosphoric acid & bicarbonate of ?

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ACTION OF CREAM OF TARTAR AND CARB. OF SODA.

Another way of ~~making~~ raising bread is by the action of cream of tartar, and carbonate of soda. The tartaric acid unites with the soda, causing the bread to ~~rise~~ The fault with this mode is

ROCHELLE SALTS.

the liability to excess of Rochelle salt being formed.

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Carbonate of ammonia is sometimes used in making crackers, but it is too expensive to be employed much.

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End of 6th Lecture, 1870.

Faults of bread:

1. Sour — from bad old flour, or sour yeast —
2. Bitter — from bad yeast, or excess of it.
3. Heavy — from ~~unskilful~~ mismanagement in mixing or baking —
4. Mouldy, if the flour was too wet —
5. Saline, from excess of cream of tartar &soda.

Hard tack — or very dry & almost tasteless bread worried very much the appetite of the soldier during the war. Yet hard dry water crackers often suit dyspeptics well. (next Horsford, of Cambridge, N.S. —

End of 7th Lecture, 1873.

Bread some like of York is in health, advantages. Like wedding feast, to smell wet go sour.

weevils calandra granaria, there is also an acarus farinæ, especially apt to be in damp flour.

colopteras cantharoides sometimes

sick wheat in Iowa

vomiting —

tritious must be con
ation. Sulphate of co
used. * ^ almost as

SULPH. OF COPPER.

BRAN.

Bran is ~~more~~ n
wheat flour. There is so
matter right unde
it becomes very vale
is the ferrous fermenting age
germination is more
the husk than in t
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DIASTASE.

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FIJI ISLANDS.

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DISEASE OF THE GRAIN.

ERGOT, SMUT, & MILDEW.

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RYE & OATS.

Rye and oats are about equal
in value, the latter being perhaps a little, the
more nourishing. ~~but the latter being~~

avenue, Atlantic City, New Jersey.
2 TWO-STORY FRAME DWELLINGS, Somerset st and Belgrade avenue, 25th Ward.
Assignee's Sale—COUNTRY RESIDENCE, Main st, Norristown; handsome garden, situation healthy.
Peremptory Sale—NEAT MODERN RESIDENCE, No. 283 south Fourth st, above Spruce st. Sale absolute.
Executor's Sale—Estate of Dr Charles Lukens, dec'd—BUILDING LOT, N. E. corner of Catharine and Holly sts, between 15th and 16th sts.
Same Estate—BUILDING LOT, S. E. corner of 16th and Catharine sts.
Same Estate—BUILDING LOT, N. E. corner 15th and Carpenter sts.
MODERN THREE-STORY BRICK RESIDENCE, No. 117 Union st, Burlington, New Jersey.
2 BUILDING LOTS, Saxon st, N. W. of Bath st, 19th Ward.
Executor's Sale—Estate of William Snowden, dec'd—3 THREE STORY BRICK DWELLINGS, S. W. corner of 11th st. and Mark's Lane, between Cherry and Race sts.
THREE STORY BRICK DWELLING, No. 51, Wood st, west of Fifth st.
Peremptory Sale—BUILDING LOT, Somerset st, south of Amber st, 19th Ward.
Trustees' Peremptory Sale—Large Iron Foundry, Steam Engine, &c., and Large Lot, Mulberry and Charles sts, Frankford, 23d Ward. Sale absolute.
Tract 320 acres, Hamilton county, Iowa.
Tract 640 acres, Hardin county, Iowa
Tract 240 acres, Kossuth county, Iowa.
Tract 640 acres, Kossuth county, Iowa.
HANDSOME COUNTRY PLACE, 4 acres, Providence road, Upper Darby, Penn'a., 1¼ miles west from DARBY—Frame House, Stable and Carriage House, and other out-buildings
Executor's Sale—Estate of Eliza Jane Brown, dec'd—BRICK AND FRAME DWELLING, Race st, east of Eleventh st.
Same Estate—Three-story Brick DWELLING, No. 1518 State st, between Race and Vine sts, 16th Ward.
Peremptory Sale—LOT, North Penn Village, 21st Ward, near Girard College, and Lands in Missouri and New Jersey. Sale absolute.
THREE-STORY BRICK STORE and DWELLING, No. 387 south 2oth st, below Spruce st.
FOUR-STORY BRICK DWELLING, No. 4 north Fifth st, between Callowhill and Willow sts.
DESIRABLE MODERN RESIDENCE, No. 117 Union st, Burlington, New Jersey. Lot 67 by 200 feet. Immediate possession.
FOUR-STORY BRICK STORE and DWELLING, No. 1839 Lombard st.

SALE OF A THEOLOGICAL LIBRARY.
ON TUESDAY AFTERNOON, MAY 17,
At the auction store, a valuable Theological Library, which includes a number of rare and standard works.

TRUSTEES' SALE.
ON MONDAY, MAY 23,
At 12 o'clock noon, will be sold at Public Sale at the Philadelphia Exchange, by order of the Trustees of the Firms lately trading as Deal, Milligan & Co. and Deal, Milligan & Huey, in pursuance of the authority of the Court of Common Pleas of Philadelphia, the remaining assets assigned to the Trustees of said Firms as per Catalogue.
Terms cash—Payable on or before May first., at 12 o'clock.
Full particulars in catalogues at the auction

117

vaccina, fungus, (common) mould, worm,

Each day's ration of a soldier is supposed o weigh from thirty-two to forty ounces, and where supplies for six or eight days are issued, the weight and bulk, especially in case of rain, induce the troops who find the ncumbrance impossible to sustain, to make way with the articles as we have heretofore tated. Professor Horsford believes that as hree-fourths of the beef and pork rations are composed of water, they should be deprived of that much bulk by compression, and he suggests that the beef ration be prepared in the form of sausage, properly seasoned, and compressed so as to expel the moisture. In this way the full meat ration can be reduced to three ounces. He also advises as a substitute for the bread ration eight ounces of roasted ground wheat, or eleven ounces of self-raising flour. Instead of ground coffee he would use a concentrated extract, properly sweetened, which could be mixed with either hot or cold water. To make the improvement complete, he suggests a plan whereby each soldier shall be enabled to cook his own rations. This is done by "enclosing the regulation canteen in two closely-fitting, concave sheet iron pans, held in place by a fork and spoon locked together, and which may be detached at pleasure. The soldier is thus provided with a plate, frying pan, bake pan, cup, fork and spoon, which take the place of similar articles now carried in a less convenient way, and with which he can prepare his ration or cook anything he may get on the march."

According to the Professor's statement an ox weighing fifteen hundred pounds furnishes but six per cent. of its weight in eatable meat; and to avoid the trouble and expense of transporting and herding cattle, he suggests that they be killed in one of the Western States, and that the meat be prepared, seasoned and condensed, and sent to troops in the field. With the aid of ing self-raising flour or roasted ged beef in bulk, an arm ight s

6th Lecture, 1870.

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Horsford, of Cambridge, U.S. —

time is also farina, especially apt to be in damp flour.

Brick soup

like Ward's advantages. health, as well as

like making fruit into jam.

calendar

" in town

sickness

vanity

[Reported for the Public Ledger.]
THE COURTS.
TRICT COURT, No. 1—*Judge Lynd.*
Court was in session yesterday for the
ll of rules and motions. Jury trials will
on Monday, the 18th inst.
JARTER SESSIONS—*Judge Paxson.*
September term of the Court commenced
day. Owing to the fact that the grand
was not full, a special venire was issued
ditional jurors returnable to-day.

tritious must be consid
ation. Sulphate of copper
used.

SULPH. OF COPPER

almost as

BRAN.

Bran is ~~more~~ nourishing ~~than~~ as wheat flour. There is so much nitrogenous matter right under the husk, that it becomes very valuable.

DIASTASE.

Diastase, which is the nitrogenous fermenting agent in the process of germination is more abundant near the husk than in the middle of the grain. In the salica there is an analogous substance, ptyalin, or salivary diastase.

FIJI ISLANDS.

~~The following is A~~ curious illustration of this fact is, that In the Fejee Islands, an intoxicating beer is made by chewing the starchy root of the long pepper plant, - macropiper methysticum. The king has a bevy of girls, selected, whose business is to make his beer in this way.

DISEASE OF THE GRAIN.

ERGOT, SMUT, & MILDEW.

Flour is sometimes made poisonous by disease of the grain. Ergot, caused by ostrayed rye - Secale cornutum, causes gangrene. Smut and mildew are less poisonous than ergot. (Puccinia, fungus common meal, larva.)

RYE & OATS.

Rye and oats are about equal in value, the latter being perhaps a little, the more nourishing, ~~but the latter being~~

**INFECTED BREAD**, it is reported, was distributed to the troops of the French army in 1843, and the cause of this deterioration of the wheat was then discovered to be due to the presence of a species of fungus, to which the name of "oidium aurantiacum" was given. It is now announced that this fungus has made its appearance in the French wheat, after an absence of twenty-eight years.

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6th Lecture, 1870.

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flour was too wet.

excess of cream of tartar & soda.

— or very dry almost tasteless very much the appetite of the war. Yet hard dry water crackers often

Horsford, of Cambridge, N.S.

here is also farina, especially apt to be in damp flour.

Bread ... some ... it ... like ... bread ... health, advantages. ... swallow ... bulk, ... swallowed ... by ...

calumba ... 22 ... sick wheat in town ... vomiting —

tritious must be considered an adulteration. Sulphate of copper is occasionally used. *

SULPH. OF COPPER

BRAN.

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RYE & OATS.

Rye and oats are about equal weevil, larva in value, the ~~latter~~ being perhaps a little, the more nourishing, ~~but the latter being~~

Oatmeal most destroyer of the two ——

. . .

R Lethby — "sallow, wheazy look of the inhabitants of the Northern States of America owing to the indigestible preparations of Indian corn — mush, hominy, or johnny which constitute the chief portions of their daily meals."

* The late Dr C. D. Meigs (Obstetrics) exclaimed against oatmeal gruel as indigestible — & prefers Graham bread or hominy. Hominy is bruised & boiled maize.

End of 6th Lecture, 1868.

ceases to be considered 1530

On

EADY.

ICAL ESSAYS.

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n Disease. VI. Tolerance of Disease. VII.
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RO-THERAPEUTICS.

oncise Manual of Medical Electricity.
Diseases. Boston

~~the most avai~~ my ~~otherwise~~ ~~bo~~ ~~makes~~ good ~~b~~ Buckwheat ~~is~~ not a native of ~~the~~ culiar to the U. States ~~in~~ extensive use,

BUCKWHEAT.

Oatmeal, below

BARLEY.

Barley is feeble, and rice still more so. This latter has less nitrogen and less fat & more starch in proportion than any other of the grains.

INDIAN-CORN.

Chinese Indian corn has the most fat of all. It is very nourishing. It is ~~not~~ used much in S. Europe. In England they cannot grow it well. In Italy it ~~is~~ supposed to produce pellagra, a disease of the skin. This can hardly be, as that disease does not occur in America. But diseased Indian corn may cause it.

PALAGRA.

OAT MEAL.

Oat meal is very nourishing. In Scotland it is a national food. Here, in the form of gruel, it is much used for the sick.

LEGUMINOUS FOOD.

We pass now to ~~the~~ leguminous food. Peas and beans are very nutritious ~~ing~~. They are highly nitrogenous. If this were all that was necessary, they would

PEAS & BEANS.

human milk. It also is one of those which contains most iron and salts, and especially the phosphate of lime so necessary for infants. It also has the property of preventing and arresting the diarrhœas which are so frequent and so dangerous at this age. According to the trials made by M. Marie, infants from four to eleven months of age fed exclusively upon Scotch oatmeal and cow's milk thrive very nearly as well as do children of the same age suckled by a good nurse. —*Gazette Méd.*, April 4, *Med. Times and Gaz.*, April 18, 1874.

al most Nitrogen of the two ——

& Lethby — "Sallow, wheaten look of the in-habitants of the Northern States of America owing to the indigestible preparations of Indian corn — mush, hominy, or johnny which constitute the chief portions of their daily meals."

* The late Dr C. D. Meigs (Obstetrics) exclaimed against oatmeal gruel as indigestible — & prefers Graham bread & mush meal or hominy. Hominy is bruised & boiled maize.

End of 6th Lecture, 1868.

On
chea after Tracheotomy.—Dr. PETER ... the attention of the Société Médicale des Hôpitaux, on December 26, 1873 (*L'Union Médicale*), to the details of a case in which tracheotomy had been successfully performed on a child aged three, attacked by croup. The canula could not be removed for three months, as each attempt to do so produced an access of suffocation. Finally it was removed; but it was ob-

~~the most avai~~ ... later,
my ~~observation~~ does not rise well ... um-
makes very good ... ind. meal
BUCKWHEAT. Buckwheat ... eat
Oatmeal, below not a native of ... ugh
the U. States
culiar to ~~the~~ in ~~veterinary~~ use, ... most pe-
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*Oatmeal as Infant's Food.*—In a communication to the Société Médicale des Hôpitaux, MM. DUJARDIN-BEAUMETZ and HARDY make known the results of the employment of oatmeal on the alimentation and hygiene of infants. According to them, oatmeal is the aliment which by reason of its plastic and respiratory elements makes the nearest approach to

*Gaz.*, Ap.

most destroyed of the two —

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End of 6th Lecture, 1868.

as compared with wheat, less gluten,
~~the most available.~~ Rye has a gum-
my ~~cohesiveness~~ power not rise well into a sponge,
but more gum- or ind. meal
very
but mixed with wheat
makes good bread. 2 rye, 1 wheat.

BUCKWHEAT. Oatmeal, below. Buckwheat is quite nourishing. Though
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BARLEY. Barley is feeble, and rice, in nitrogen,
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INDIAN-CORN. Chinese live well on it, however.
Indian corn has the most fat of
all. It is very nourishing. It is ~~not~~
used much in S. Europe. In England
PALAGRA. they cannot grow it well. In Italy it
was once supposed to produce pellagra, a
severe disease of the skin. This can hardly
be, as that disease does not occur in
America. But diseased Indian corn may cause it.

OAT MEAL. Oat meal is very nourishing. In Scotland
it is a national food. Here, in the
form of gruel, it is much used for the sick.

LEGUMINOUS FOOD. We pass now to ~~the~~ leguminous
PEAS & BEANS. food. Peas and beans are very ~~nourish-~~
~~ing~~ They are highly nitrogenous. If this
were all that was necessary, they would

Zea mays another

*Ipomoea batatas, Gray.

DEFICIENCY OF SALTS.

stand even above wheat; but wheat has more phosphates ~~and other salts~~ in which peas and beans are relatively deficient. (Peas & beans are extremely valuable on journeys and voyages) Care is necessary in selecting and cooking them.

LIMA BEANS.

Lima beans should be young and tender.

STRING-BEANS.

String beans, besides this, should be well boiled. They require four hours boiling.

POTATO.

The potato comes next. It is a tuberous ~~bulbous~~ ~~or rather underground stem; not properly a root~~ staple articles of food

NATIVE OF AMERICA.

It is one of the few ~~things~~ native to America. Humboldt found it growing wild in South America. Andes.

WHITE & SWEET.

Before the discovery of the white potato (Solanum tuberosum), the sweet or Spanish potato (~~convolvulus~~ batatas, edulis) was the one used in Europe. They are both digestible, but dyspeptics should avoid them. They should choose rather, the tomato. which is far more digestible.

DIGESTIBILITY.

~~The potato is perhaps more digestible than the parsnip, although from actual tests we would think it was the other way.~~

Yam — Dioscorea Sativa — good

Eddoes.

Something similar much eaten

in the Sandwich Islands.

Tomatoes!

Asparagus! Salsify oyster plant, Artichokes

SUGARY DEGENERATION

LIABILITY TO DISEASE.

VARIETY OF VEGETABLE FOOD.

CARROTS. PARSNIPS.

TURNIPS

When fresh, good, this sweet potato is as digestible as the white. It easily sprouts, showing that it is undergoing a sort of sugary degeneration. Then it is not digestible. The potato is not a good article to depend on as a national food. It is the misfortune of Ireland, that such has been the case with them. Vegetables are liable to diseases which as the potato plant may spread for leagues. Famine is thus caused by failure of a single crop. No one vegetable should be depended on alone.

Variety in vegetables used is greater here than in Europe. In England we seldom see anything, but potatoes cabbage, peas, cauliflower and celery. Beets, they give to the cattle. Indian corn needs more sunshine & heat than we have. We have some other vegetables that they never think of. (Yam) Tomatoes! quite

Carrots and parsnips are digestible. The latter should be first boiled, mashed and then roasted.

Turnips have a bad reputation. They are said to produce flatulence. If they are young and tender,

◊ Brassica oleracea — still native wild
on rocks in some parts of England

X Mansion House roast beef
Said to be flavored by a slight suggestion as it were of asafoetida.

already said ?

especially the ruta baga turnip.

CABBAGE

however, they are good enough for all healthy stomachs. Cabbage has the same unjustly bad reputation. Dr. Jacobi says, that it is the most nitrogenous vegetable except the mushroom. It is good for diabetics, having less sugar and starch than any other vegetable.

CAULIFLOWER

Cauliflower is a cultivated variety of cabbage, more delicate; so is broccoli.

SAUERKRAUT.

Sauerkraut is cabbage in which fermentation has commenced. Some butyric acid is formed. It is mostly an acquired taste to relish it.

REMARKABLE FACT CONNECTED WITH OFFENSIVE FOOD.

It is remarkable that very offensive food can be eaten and even relished, when in very small quantities. Thus butyric acid, when strong, is very offensive. Onions, considered so by many, give a good flavor to other food. In Spain, they use garlic, and in the East, asafœtida. In small amounts

RAW VEGETABLES.

Many vegetables are eaten without cooking, as cabbage, radishes, celery, salad, onions &c. They are luxuries but they are also almost necessaries. Instinct calls for them. We gain by

Tomatoes, forgotten, 1876

GW

* In 1868 General Grant issued an order from Washington that every military station should have a proportionate vegetable garden, or gardens, for the soldiers, to raise their own fresh vegetables. Very good.

ANTI-SCORBUTICS

eating them. They are more anti-scorbutic than cooked vegetables. Fresh fruits also, are anti-scorbutic. The potato is the best of all. Experience shows that a deficiency of fresh vegetables causes scurvy. Cold and the absence of fresh meat promote it. Fatigue also, promotes it. It is now a well-understood thing that an army requires fresh or dessicated vegetables.

FRUIT.

COLD

ABSENCE OF FRESH MEAT.

DESSICATED VEGETABLES.

Desiccated vegetables are such as have water extracted. When cooked they swell. They are not quite as good as the fresh.

ARMY OF THE POTOMAC.

In the first year of the war, especially in the career of the Army of the Potomac, the soldier suffered much from the absence of fresh vegetables; but after experience had shown the government its mistake, it was better supplied

DEBILITY, DEPRESSION, &C.

The absence of fresh vegetables often causes debility, depression, palpitation, swollen gums &c., being not actually scurvy, but modifications of other diseases.

Scorbutic

Describe Chickahominy scorbutic cases — emaciation, debility, diarrhea — indigestion — & purpura extravasations on limbs, breast, abdomen. 13 deaths so — only one recovered who had purply spots on the breast; several who had them on the legs and arms.

End of 1st Lecture.

Wine

‡ Headland asserts experience proves that citric acid is antiscorbutic.

[End of 6th Lecture on Alimentation, 16th of Course — 1871]

* The same statement does not apply to preserves, made with an excess of sugar — which a very little of may be taken with advantage by any one — & none by the dyspeptic.

(Cakes & pastry, by the way.)

[End of 22nd Lecture, 1872.]

Peninsula campaign

— Crimean war

It is importa

anti scorbutic

~~berry leaves~~) a

are valuable.

Fruits alone,

ben found in

oranges and le

scurvy. Neither

alkalis taken

no certain pre

Fruits are

They supply so

what, to the blood.

action of the bowels and the secretion

of the intestines. Stewed are next in value to

raw. We should eat fruit every day.

~~especially~~ in the time of cholera.

Cholera is an epidemic, systemic

disease. In 1832, the free use of fruit

~~has been known to prevent~~ cholera

while those who lived on such slim

diet as rice water, often caught it.

which ceases to [illegible] voice depends, is perhaps no less difficult and wonderful. The little vibrating cords, situated deep in the throat, are now illuminated by the surgeon's mirrors, and the philosophy of sound as produced by human organs is studied directly under the eye of the student. The surgeon's knife is also made to pass among these delicate harp strings, and morbid growths which arrest their vibrations are successfully removed.

The triumphs of modern dental surgery we may point to, with pride and satisfaction. In no country has so great degree of perfection been reached in the dental art, as in this. American dentists in Europe are patronized by nearly all the crowned heads, and fortunes have been made by our dentists, practising in the European capitals. Thirty or forty years ago, quite one half the people we met, in our business and social connections, were writhing in the agony of "tooth-ache." Children were expected to pass through a period of a dozen or twenty years tormented almost continuously with dental pains, from which there was no relief save by cruelly uprooting the teeth from their bony sockets. Now, instances of toothache are rare among those who take proper care of their teeth, and who promptly call to their aid the dentist when the first signs of decay are noticed. We have during the past year been in the dentist's chair for many hours or even days, and through the admirable skill of the operator,

fruits are arranged in this table according to the percentage of soluble matter. This, other things being equal, is a fair measure of their comparative values for food. The percentage of water does not show this value so well, because of the great difference in the percentages of insoluble matters. This latter item consists chiefly of seeds and skins, with a small quantity of insoluble cellulose and pectose, the latter rarely amounting to one fifth. The sugar in the first column includes both saccharose, or "cane sagar," and fructose, or "fruit sugar." The acid in the second column is expressed as hydrated malic acid.

COMPOSITION OF FRUITS.

| KINDS OF FRUIT. | SOLUBLE MATTERS. | | | | | | Insoluble Matters. | Water. |
|---|---|---|---|---|---|---|---|---|
| | Sugar. | Free Acid. | Albumenoids. | Pectine Bodies, Gum, and Organic Acids in Combination. | Soluble Ash Ingredients. | Total Soluble Matters. | | |
| Apples | 6.40 | .62 | .48 | 7.04 | .29 | 14.83 | 3.13 | 82.04 |
| Apples, another variety | 7.58 | 1.04 | .22 | 2.72 | .44 | 12.00 | 2.96 | 85.04 |
| Grapes | 12.18 | .91 | .75 | .36 | .37 | 14.57 | 3.03 | 82.40 |
| Cherries | 10.23 | .79 | .94 | 1.83 | .65 | 14.49 | 6.01 | 79.50 |
| Pears, sweet red | 7.47 | .04 | .25 | 3.84 | .28 | 11.88 | 4.63 | 83.49 |
| Pears, large Holland | 1.57 | .67 | .62 | 8.30 | .67 | 11.83 | 7.40 | 80.77 |
| Apricots | 1.34 | .84 | .61 | 7.60 | .78 | 11.17 | 5.34 | 83.48 |
| Gooseberries | 7.12 | 1.43 | .42 | 1.18 | .38 | 10.53 | 3.42 | 86.21 |
| Currants | 6.38 | 2.15 | .59 | .15 | .30 | 9.77 | 5.42 | 84.81 |
| Strawberries | 7.57 | 1.13 | .36 | .12 | .48 | 9.67 | 2.86 | 87.47 |
| Whortleberries | 5.78 | 1.34 | .79 | .56 | .86 | 9.33 | 13.12 | 77.55 |
| Plums, blue and black | 2.13 | 1.30 | .43 | 4.08 | .52 | 8.48 | 4.52 | 87.00 |
| Raspberries, garden | 4.20 | 1.23 | .69 | 1.58 | .43 | 8.05 | 4.58 | 87.37 |
| Blackberries | 4.41 | 1.19 | .57 | 1.44 | .41 | 8.00 | 5.39 | 86.41 |
| Raspberries, wild | 3.60 | 1.08 | .55 | 1.11 | .27 | 7.51 | 8.64 | 83.86 |
| Strawberries, wild | 3.90 | 1.49 | .59 | .10 | .67 | 6.75 | 6.10 | 87.15 |

Gooseberries

16

…tic cases — emaciation, debility, …
…ations on limbs, breast tabescent. +
…d purple spots on the breast;
…ths.
Lecture.

…me)
…ving that citric acid is
…ture on Alimentation,
of Course — 1871 ]

*/ The same statement does not apply to preserves, made with an excess of sugar — of which a very little only may be taken with advantage by any one — & none by the dyspeptic.

(Cakes & pastry, by the way.)

[End of 22nd Lecture, 1872.]

Peninsula campaign — famous for sufferings — Crimean war perhaps one worse for a while.

It is important to know what are anti-scorbutics. In New Mexico, ~~poke berry leaves~~ are used. Cactus leaves are valuable. Poke-leaves — Sorrel — Wood sorrel.

POKE BERRY.

CACTUS.

Fruits alone, will not suffice. It has been found in a tropical climate that oranges and lemons would not prevent scurvy. Neither will the acids nor the alkalis taken from fruits do. There is no certain preventive but the vegetables in diet.

FRUITS ALONE, NOT ENOUGH.

Fruits are as a rule valuable and wholesome. They supply something, we know not what, to the blood. They promote the action of the bowels and the secretion of the intestinal glands. Stewed fruits are next in value to raw. We should eat fruit nearly every day altogether.

STEWED.

~~especially~~ in the time of cholera.

Cholera is an epidemic, systemic disease. In 1832, the free use of fruit ~~was neglected by many who escaped the~~ has been known to prevent cholera while those who lived on such slim diet as rice water, often caught it.

CHOLERA.

# Best Drinking Water: per gallon.

| | | |
|---|---|---|
| Organic matters | not above | 1.5 gr. |
| Carbonate of lime | " " | 16.0 |
| Sulphate " " | " " | 3.0 |
| Carbonate & Sulphate of magnesia | " " | 3.0 |
| Chloride of sodium. | " " | 10.0 |
| Carbonate of potassa & Soda. | " " | 20.0 |
| Sulphate " " " " | " " | 6.0 |
| Iron. | " | 0.5 |

Total Solids. not above 35 grains per gallon. 8 gr. to

Gases. Nitrogen 6 cubic inches " "
Oxygen 2.5 " " " "
Carbonic Acid 5½ to 7 " " "

## Contents of River Water

1. Gases:- air, oxygen, nitrogen, carbonic acid, sulphuretted hydrogen & carburetted hydrogen.
2. Organic Matters:- humin, ulmin, humic & ulmic acids, butyric acid, glairine, zoögene, and complex vegetable & animal matters.
3. Mineral Substances:- chloride of sodium, sulphate of soda, carbonate of soda, carbonate of lime, sulphate of lime, chloride of calcium, silicate of lime, and carbonate of magnesia &c.

Figs[3] — Pears[1] — Plums[2]
(Prunes, figs, dates, Laxative)

Lecture VII.

FRUITS. Comparing the wholesomeness of different fruits we find that the peach is the

PEACH. most digestible both by dyspeptics and

APPLE. those in good health. Next comes the apple although here there is much difference. The orange comes next. Without enumerating all the fruits, we may say that the least digestible domestic fruit, as they are the got in town markets,

CHERRY & PINE-APPLE. is the cherry; and, imported, the pineapple. The latter is too tough. All fruits are best just from the tree, after a few hours or days, they lose their freshness.

BERRIES Among berries, it is remarkable, that

CURRANTS. the currant is the most digestible although from its acidity we would be led to conclude differently. As is the case with fish, so with berries, idiosyncracies are common.

acids sometimes relieve acidity

Before we take up the accessory foods, the condiments and the beverages, tea, coffee, cocoa & alcohol, we will however first speak of water & other beverages briefly

# Convulsions in children.

Well fed, properly fed children, who get enough exercise & fresh air, seldom of their own accord eat too much. But a child to whom sweet things, as cakes or candies, are given often between meals, — or whose palate is pampered with savoury things at the table, is not properly fed. Among those who have only wholesome things given them, I believe that excess is rather uncommon; more so than among adolescents or adults, whose natural instincts have been spoiled by indulgence.

The bad effects of special errors in diet.

~~unwholesome food, and of water~~

EXCESS OF FOOD.

Excess of food often produces indigestion, flatulent colic &c. and promotes bilious colic, cholera morbis, diarrhœa, ~~convulsions in children~~, dyspepsia, sometimes when these are not caused, there is formed a collection of half-putrefied matter in the alimentary canal. This is ~~occasionally~~ vomited and in a few cases it has been found in the intestines after death. Hottentots are great gluttons. Even in civilized life examples are numerous. Some of the Roman emperors would tickle their fauces after one dinner, so that they could eat a second dinner right away.

INDIGESTION, COLIC, CHOLERA MORBIS, DIARRHŒA, COLLECTION IN THE BOWELS,

HOTTENTOTS.

ROMAN EMPERORS.

ABSORPTION.

These putrefied masses are often absorbed. An excessive amount, more than is required, may be digested. Plethora is thus caused. It is however difficult to determine in some cases whether the signs occurring belong to this or to a different condition. Fulness of blood, a high color, and a general rounding of the body, fat being rather largely formed, characterize it. There is an excess of red corpuscles in the blood. Some tendency to hemorrhage exists with it.

PLETHORA.

SIGNS OF PLETHORA.

Mixing Tea
Hydramic
(Surplice
May 1st 1871

Pregnancy woman, &

Cornod

Alcathe, the theory named: Headland a different
one — Lactic acid + urea + O = Uric acid.

End of 7th Lecture, 1869

End of 7th Lecture 1870.

adolescent & middle

~~ceased~~. It is more common in ~~early~~ life than in old age although it sometimes occurs then, and is then more dangerous. (Apoplexy, &c) It is denied by some that the amount of blood varies. They say that where there is a momentary excess the exhalations become greater, and that even by large hemorrhages the blood is only made more watery.

VARIATION IN THE BLOOD.

LIVER

The liver is sometimes enlarged by excess. Pate de foie gras — of Strasburg. (stimulate liver).

GOUT

URIC ACID

UREA.

Gout is also promoted by excess. Uric acid is formed in muscle in the blood. A large part of Bulk is converted by oxidation into urea. This accumulates from a deficiency of oxidation or from an excessive supply of nitrogenous food. If we consume an excess of meat and ~~liquor~~ and do not exercise enough, gout may be followed. Alcohol merely promotes it. We find that the strongest alcoholics do not cause it. Acidity? It is then, excessive nitrogenous food that produces gout. Gout is also hereditary.

ALCOHOL IS ONLY A PROMOTER.

EXCESS IN ONE ARTICLE

As to excess in one article, ~~something may be said~~. Dr. Hammond lived

Chossat?
By a French physician during a famine in France; also, in accounts from by men shipwrecked at sea & by one or two prisoners committing suicide by voluntary starvation.

How studied? How long endurable before death?

Average, 10 days. (Man floating in atlantic, 9 days.

Jarvis' case! Fraudulent pretence - cases, one 1870 in England.

Benjamin Lay — 2 weeks — comfortable; Then soon delirious, & fed.

Another holding out longer, but dying — (4 or 5 weeks?

Dr. Tanner, N.Y. 1880. 40 days on water

Exclusively vegetable diet is by some believed to promote rheumatism; by others a lactic acid diathesis — analogous to the uric acid diathesis of gout.

Banting-ism.

End of 8th Lecture 1873

ALBUMEN

large amount of pure albumen for five days on an excess of albumen. The result was that he became feverish, and had diarrhoea and albuminuria.

STARCH

An excess of starch is carried off by the bowels. Hence it is not nourishing.

FAT.

An excess of fat causes indigestion and disorders of the liver. Biliousness is caused by rich food.

DEFICIENCY OF FOOD.

We will now speak of the opposite state viz. a deficiency of food. After the first suffering of starvation is over, no hunger is felt. There is a sense of sinking, & distressing pain. Debility, delirium, febrile symptoms, diarrhoea & collapse are caused. This lasts from a week to a month according to the strength of the individual, and is followed by death.

DEFICIENCY OF ONE KIND.

An insufficiency of one kind comes next in order.

ALBUMEN.

A deficiency of albumen promotes debility, and scrofula is thus favored.

SCROFULUS.

~~The causes of scrofula are not clearly defined. It seems that the absence of light promotes it.~~

FAT.

A deficiency of fat tends to promote consumption. Waste of fat is its first symptom, as already remarked.

The possibility of the undesigned poisoning of food is sometimes important.

1867
N.Y. state

End of 7th Lecture
1868

Pickles in Copper vessels:

Cooking any food in Copper kettles;

Using for cooking, tea, coffee, &c water heated in copper boilers;

all dangerous

Canned fruits hardly safe on account of lead in the solder. Glass is perfectly safe.

Tinned saucepans

WATER.

THIRST.

QUANTITY OF WATER.

~~Enough has~~
~~fiddle~~ ~~day of fast~~

We now take
sable. Nothing can
Unlike that of hu
til death. The qua
we take is very
our bodies ~~is~~ a
to ~~keep~~ ~~up~~ the
in the tissues,
in the saliva,
creatic liquid &c.
by supplying wate
3 to 5 pints water daily required
The quantity
health is estima
½ a fluid ounce fo
body. If a man
he should take
this 20 to 30 ~~oz~~ will
food. The amoun
with the weather
exercise. ~~Water~~
he may drink thr
when he is idle.

WIN, on the 27th ...

His relatives and friends are respectfully invited to attend the funeral, from the residence of his mother, Mrs. Margaret Erwin, in Craig's court, Shackamaxon street, below Frankford road, on this afternoon, at 3 o'clock. To proceed to Franklin Cemetery.

ESHER.—On the 29th ult., LINNAEUS B., son of Conrad S. Esher, aged 29 years and 3 months.

His relatives and male friends, the Paradise Lodge, No. 127, of the I. O. of O. F., the Harris Encampment, and the Innominata, are respectfully invited to attend his funeral, from his father's residence, 624 North Twelfth street, this afternoon, at 3 o'clock.

FARRY.—On the 31st ult., WILLIAM MALTMAN FARRY, son of John H. Farry, aged 3 months 2 weeks and 12 days.

I take this little lamb, says He,
And fold it on my breast;
Protection it shall find in me,
In me, the Eternal rest.

The relatives and friends of the family are respectfully invited to attend the funeral from the residence of his parents, 214 Moore street, on Sunday afternoon. To proceed to Macphelah Cemetery. **422

FIRTH.—On the 29th ult., WALTER W., son of James C. and Matilda L. Firth, aged ten months.

Gone, but not forgotten.

FREY.—On the 30th ultimo, SUSAN FREY, aged 56 years.

The friends of the family are respectfully invited to attend the funeral, from her late residence, Haddon Place, Poplar street, above Seventh, this day, June 1st, at 3 o'clock. *9

GEARY.—On the 30th ult., Mrs. CATHARINE GEARY, aged 61 years.

The relatives and friends of the family are respectfully invited to attend the funeral, from the residence of her sister, Mrs. Hogan, 932 Lafayette street, above Federal, this (Friday) afternoon, at 3 o'clock. Service at St. Paul's Church. Interment at Cathedral Cemetery. *366

GRAVELL.—On the 30th ult., GEORGE J. GRAVELL, in the 26th year of his age.

His relatives and friends of the family, and the members of Chosen Friends Lodge, No. 100, I. O. of O. F., are respectfully invited to attend his funeral, from his late residence, No. 1011 Callowhill street, on Monday, June 4th, at 2 o'clock P. M. ***385

HEATON.—On the morning of the 31st ultimo, MARY P. L. HEATON, in the 76th year of her age.

The relatives and friends of the family are invited to attend the funeral, from the residence of her husband, 1025 Spring Garden street, on Seventh-day, at 2 o'clock. Interment at Fair Hill. **495

HENSON.—On the 29th ult., MARY, wife of John Henson, in the 82d year of her age.

The relatives and friends of the family are respectfully invited to attend the funeral, from the residence of her son, William Henson, No. 4429 Main street, Germantown, this afternoon, 1st inst., at 2 o'clock. *

HILL.—On the 28th ultimo, Mr. GEORGE M. HILL, in the 58th year of his age.

His relatives and friends are respectfully invited to attend the funeral, from his late residence, No. 1343 Hanover street, 18th ward, on Saturday afternoon, at 3 o'clock. **

HOLBERT.—Suddenly, on May 30th, ELIZABETH HOLBERT, aged 75 years.

The relatives and friends of the family are respectfully invited to attend the funeral, from the residence of her brother-in-law, Samuel Carpenter, Ridge avenue, above the seven-mile stone, on Saturday afternoon, June 2d, at 2 o'clock. Funeral to proceed to the Baptist Cemetery, Roxborough. **10

KELLY.—On the 31st ultimo, Mr. CORNELIUS KELLY, in the 54th year of his age.

The relatives and friends of the family, and the members of the St. Vincent de Paul's Society, are respectfully invited to attend the funeral, from the residence of his brother-in-law, Mr. George Kelly, No. 1403 North Second street, above Master, on Saturday morning, at 8½ o'clock. Service and interment at St. Michael's. **346

KLEWELL.—On the 30th ult., ANNA ELIZA, infant daughter of Abraham C. and Ellen Klewell, aged 11 months and 4 days. *105

McCAREY.—On the morning of the 30th ultimo, Mrs. ELIZABETH McCAREY, wife of Robert McCarey, in the 37th year of her age.

The friends and relatives of the family are requested to attend the funeral, from the residence of her husband, No. 133 Birch street, Camden, N. J., this day, June the 1st, at 2 o'clock. To proceed to Cathedral Cemetery.

MILLER.—On the 30th ult., ELIZABETH W. MILLER, widow of the late George Miller.

The relatives and friends of the family are respectfully invited to attend the funeral, from her late residence, 810 St. John street, on Monday afternoon, June 4th, at 3 o'clock. Interment at South Laurel Hill. **322

MURPHY.—On the 29th ultimo, TIMOTHY S. MURPHY, son of Timothy and the late Catharine Murphy, aged 33 years.

The relatives and friends of the family are respectfully invited to attend the funeral, from the residence of his father, No. 609 Charles street, between Fourth and Fifth, below South, this day, at 2 o'clock. Funeral service at the Church of St.

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[Special Despatch to the Public Ledger]

## Wholesale Lead Poisoning in the Walkill Valley, N. Y.

OVER THREE HUNDRED CASES IN VARIOUS TOWNS—FRIGHTFUL FORMS OF LEAD COLIC, PARALYSIS, ETC.—CARELESS USE OF LEAD IN A GRIST MILL—SEVEN CASES IN NEW YORK CITY.

MIDDLETON, N. Y., May 30—It now nearly two months since the people residing along that portion of the Walkill Valley which lies in the western part of Orange county were attacked by a disease which for some time baffled the skill of the physicians, they being at a loss to divine the cause. The malady, it is true, exhibited the most positive symptoms of lead poisoning, yet all the sufferers stoutly denied having used anything that could have been contaminated with lead. In some instances whole families were stricken down, while in others only one or two were attacked. Many of the cases resulted in death. To-day hundreds are suffering from its effects.

Among the symptoms most prominent in these cases were severe colic pains, nausea and persistent vomiting, cramps and partial paralysis of the upper extremities, and an anxious, gloomy expression of countenance.

Professional men at once saw that these symptoms pointed to and were characteristic of lead poison; but it was also observed that some or all of them were encountered in other and far different forms of disease. The only symptom which, regarded by itself, was conclusive as to the lead poison was the blue line at the margin of the teeth, which was present in almost every case. The doctors were sorely perplexed, but in about two weeks after the first violent cases came under their notice, they had established the fact of the presence of lead in the system of the patients. It now remained to ascertain the source from whence it came.

After considerable research it was found that the lead was taken by the sufferers in bread and meal, and as a greater part of those staples were manufactured at a mill in Phillipsburg, an investigation was at once made in that direction, and the following facts were elicited:

It appears that the proprietor of the mills had gained a reputation for the superior quality of his flour, and that the farmers, for many miles around, were in the habit of bringing their wheat and corn to his mill to be made into flour and meal. Aside from this, he exported largely, so that his mill was kept constantly going, by night as well as by day. One set of stones was set apart for his "custom" work. This was an old set, constantly needing repairs, and large cavities frequently manifested themselves, which, instead of being filled up with the cement generally used for that purpose, were filled with common lead. Some of these holes were as large as a hen's egg; one, we are informed, being as large on the surface as the palm of a man's hand.

If when filled the lead projected above the surface of the stone, it was hammered down level. Of course the attrition of the grinding detached minute particles of lead from the stone, and mingled them with the flour. The lead thus communicated, when fermented and subjected to baking with the flour, was immediately transformed into carbonate of lead, one of the deadliest of poisons.

As soon as it was ascertained that the disease originated from the bread eaten by the sufferers, samples of the flour were analyzed by Dr. Dorrance and Mr. King, a chemist, of Middleton. These gentlemen found, to their astonishment, that the lead could be discerned with the naked eye. It was, however, subjected to the usual standard tests, all of which revealed the presence of lead in considerable quantities. Of course, these revelations caused a panic throughout the surrounding country.

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The possibility of the undesigned poisoning of food is sometimes important.

1867 N.Y. state

End of 7th Lecture 1868

Pickles in Copper vessels:

Cooking any food in Copper kettles;

Using for cooking, tea, coffee, &c water heated in copper boilers;

all dangerous

Canned fruits hardly safe on account of lead in the solder.

Glass is perfectly safe.

Tartaric Acid Soda

WATER.

THIRST.

QUANTITY OF WATER.

It is announced that M. Nickles, Professor of Chemistry at Nancy, France, has discovered a circumstance which may be of importance to public health. It seems that bakers have been lately in the habit of heating their ovens with old painted wood, got cheap from the demolition of houses. But bread baked in such an oven acquires poisonous qualities from the white lead, verdigris, and other noxious substances contained in the paint; and M. Nickles shows that these substances are absorbed by the crust, and do not penetrate to the crumb.

~~Enough has be~~ ~~ficiency of fresh~~ We now take up ~~an~~ indispensable. Nothing can equal the agony of thirst. Unlike that of hunger, it does not cease until death. The quantity of water which we take is very great. Nearly three-fourths of our bodies is water. It is necessary to keep up the circulation of the fluids in the tissues. Besides entering into the composition of organs and tissues, the secretions in the saliva, gastric juice, bile, pancreatic liquid &c. is great. We are constantly supplying water thus from the blood. 21 pounds in all, daily! Not all of secretions, but most 3 to 5 pounds of water daily passed out from the body. The quantity of water necessary to health is estimated to be for an adult ½ a fluid ounce for every pound of his body. If a man weighs about 140 pounds he should take 70 to 90 oz. of water. Of this 20 to 30 oz. will be found in his solid food. The amount ~~daily~~ taken varies with the weather and ~~the amount of~~ exercise. If a man works hard he may drink three times as much as when he is idle.

End of 5th Lecture on alimentation water 1875.

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[Special Despatch to the Public Ledger]

## Wholesale Lead Poisoning in the Walkill Valley, N. Y.

OVER THREE HUNDRED CASES IN VARIOUS

sionally, *without notice*, say, take any day or any week of days, and, with the "Tickler" in hand, require the production of the paper described.

5. Do the same with regard to other securities and investments of the bank.

6. Rotate the Individual Ledger Book-keeper quarterly, by drawing lots, and if there be no other way of changing the General Ledger Book-keeper, include him in the rotation of the Individual Ledgers.

7. Don't let any man stay so long in one position as to become imbedded in his tracks or

thing that could have been contaminated with lead. In some instances whole families were stricken down, while in others only one or two were attacked. Many of the cases resulted in death. To-day hundreds are suffering from its effects.

Among the symptoms most prominent in these cases were severe colic pains, nausea and persistent vomiting, cramps and partial paralysis of the upper extremities, and an anxious, gloomy expression of countenance.

Professional men at once saw that these symptoms pointed to and were characteristic of lead poison; but it was also observed that some or all of them were encountered in other and far different forms of disease. The only symptom which, regarded by itself, was conclusive as to the lead poison was the blue line at the margin of the teeth, which was present in almost every case. The doctors were sorely perplexed, but in about two weeks after the first violent cases came under their notice, they had established the fact of the presence of lead in the system of the patients. It now remained to ascertain the source from whence it came.

After considerable research it was found that the lead was taken by the sufferers in bread and meal, and as a greater part of those staples were manufactured at a mill in Phillipsburg, an investigation was at once made in that direction, and the following facts were elicited:

It appears that the proprietor of the mills had gained a reputation for the superior quality of his flour, and that the farmers, for many miles around, were in the habit of bringing their wheat and corn to his mill to be made into flour and meal. Aside from this, he exported largely, so that his mill was kept constantly going, by night as well as by day. One set of stones was set apart for his "custom" work. This was an old set, constantly needing repairs, and large cavities frequently manifested themselves, which, instead of being filled up with the cement generally used for that purpose, were filled with common lead. Some of these holes were as large as a hen's egg; one, we are informed, being as large on the surface as the palm of a man's hand.

If when filled the lead projected above the surface of the stone, it was hammered down level. Of course the attrition of the grinding detached minute particles of lead from the stone, and mingled them with the flour. The lead thus communicated, when fermented and subjected to baking with the flour, was immediately transformed into carbonate of lead, one of the deadliest of poisons.

As soon as it was ascertained that the disease originated from the bread eaten by the sufferers, samples of the flour were analyzed by Dr. Dorrance and Mr. King, a chemist, of Middleton. These gentlemen found, to their astonishment, that the lead could be discerned with the naked eye. It was, however, subjected to the usual standard tests, all of which revealed the presence of lead in considerable quantities. Of course, these revelations caused a panic throughout the surrounding country.

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186 N.Y. State

Mr. lows: Janua all me elected same of Ja said t

End of 7th Lecture 1868

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Canned fruits hardly safe on account of lead in the solder. Glass is perfectly safe.

ATOMS.

A PRUSSIAN physician has examined the enamel on hollow-ware sold in Berlin, and reports that the enamel on a stew-pan made in Belgium contained so much lead that 15 centigrammes of oxide of lead (2¼ grains) was found dissolved in one litre of vinegar (3 per cent acetic acid) which had been boiled in it for one hour.-

Enough has been said to show the accuracy of fresh

WATER.

We now take up Water. It is indispensable. Nothing can equal the agony of thirst. Unlike that of hunger, it does not cease until death. The quantity of water which we take is very great. Three-fourths of our bodies are water. It is necessary to keep up the circulation of the fluids in the tissues, besides entering into the composition of organs & tissues & secretions. The amount which passes, in the saliva, gastric juice, bile, pancreatic liquid &c. is great. We are constantly supplying water thus from the blood. (2½ pounds in all, daily, of secretions, not all of which is water.) 3 to 5 pounds of water daily passed out from the body. The quantity of water necessary to health is estimated to be for an adult ½ a fluid ounce for every pound of his body. If a man weighs about 140 pounds he should take 70 to 90 oz. of water. Of this 20 to 30 oz will be found in his solid food. The amount naturally taken varies with the weather and the amount of exercise. If a man works hard he will drink three times as much as when he is idle.

THIRST.

QUANTITY OF WATER.

End of 5th Lecture on alimentation. water 1875.

138

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OVER THREE HUNDRED CASES IN VARIOUS STAGES OF LEAD COLIC.

...tionally, we have devoted to our little monthly ... medical news alone which is presented, but ... cause they obtain, in a concise form, the interesting facts and discoveries pertaining to all departments of science. A progressive physician realizes the importance of keeping up, not only with the medical sciences, but with all others ... any man stay so ... sition as to become imbedded in his ... thing that could have been contaminated with lead. In some instances whole families were stricken down, while in others only one or two were attacked. Many of the cases resulted in death. To-day hundreds are suffering from its effects.

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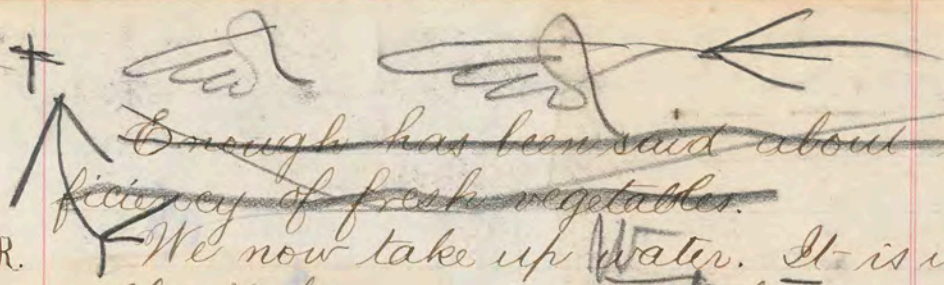

~~Enough has been said about the de~~
~~ficiency of fresh vegetables.~~

WATER.

We now take up water. It is indispensable. Nothing can exceed the agony of thirst. Unlike that of hunger, it does not cease until death. The quantity of water which we take is very great. Nearly three-fourths of our bodies is water. It is necessary to keep up the circulation of the fluids in the tissues, the amount which passes, in the, saliva, gastric juice, bile, pancreatic liquid &c. is great. We are constantly supplying water thus from the blood. (2½ pounds in all, daily, of secretions, and all of it must be supplied) 3 to 5 pounds of water daily passed out of the body. The quantity of water necessary to health is estimated to be for an adult ½ a fluid ounce for every pound of his body. If a man weighs about 140 pounds he should take 70 to 90 oz. of water. Of this 20 to 30 oz will be found in his solid food. The amount ordinarily taken varies with the weather and the amount of exercise. If a man works hard he will drink three times as much as when he is idle.

THIRST.

QUANTITY OF WATER.

End of 5th Lecture on alimentation water
1875.

## Varieties of Waters

Distilled —
Rain —
Melted Snow
Melted Ice
Spring — ordinary
Well — Common & Artesian —
River & Lake
Marsh
Sea Water. (Over 300 gr. saline subst. in a pint)

& Mineral —

N.Y. has now an available daily supply (1880) of 95 million gallons. London, 98 million gallons.

N.Y. has 277 Miles of Sewers!

☒ G. W. Baird, U.S.N. (Fr. Inst. Journ., Jan. 72) gives this table, — of Vols of Gases dissolved by pure (dist.) water at ord. temp. & press.

| Carb. acid | Oxygen | Nitrogen | Sulph. Hydr. | Carb. Ox. | Marsh Gas |
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Water, after absorbing 400 times its vol. of ammonia still will seize the usual amount of other gases; but the quantity of Oxygen necessary to decomp. organic matter in water is much greater when other gases are present. Aeration of distilled water purifies it, by oxidation of organic matter passing over with the steam. Filtration perfects this purification. (Experiments by Dr Frankland with permang. potassa show that without aeration, or agitation in some way, oxidation of organic matter is a slow process.) Sea water much better than bilge-water to distil.

On ship-board, Customary (men, of war at least) 1 gallon per man of water allowed daily — 1/2 of it going

1

35 GALLONS PER HEAD.

Including cle… thing, 16 gallons per … be supplied to each … sewerage 9 gallons mo… gallons.

ROMAN BATHS. In the baths of … were allowed. In h… 0 to 50 gallons are allow… of water

DISTILLED WATER. There are … The purest … water. But it lack… the sense of wholesomeness.

SPRING WATER. ~~Spring water is very good has its composition is the same as that of the serum of~~

DISTILLED. ~~the blood.~~ When there is no other kind to be had, as at sea, distilled water may be used. If it is passed through charcoal and aerated it is much improved.

RAIN. Rain is purer than many waters but has dissolved foreign substances. It contains besides air & free oxygen, carbonic acid, carbonate of ammonium, nitric acid (especially in summer), ammonia and sulphuric & sulphurous acids. The latter two are particularly present in cities where coal is burnt

CONTENTS.

tion, croakers to the contrary notw… ing.

—The section of new road in Io… built in charge of and under lea… Rock Island Company, it is said, ha… the required $1,000,000 in the 6 per … rency bonds of the Rock Island C… with a yearly sinking fund of $4… 1877. The negotiation leaves the l… plus of income of the Rock Islan… turbed.

SALES AT THE STOCK EXCHANGE.

BEFORE BOARDS.

| | | | | | |
|---|---|---|---|---|---|
| 2 9-10 | Leh Vall all | 60½ | 19 shs | Penna R | |
| 2-10 | do | 64 | 300 | do | |
| 202 shs | Reading R | 56 | 200 | do | b |

FIRST BOARD.

| | | | | | |
|---|---|---|---|---|---|
| $100 | City 6s new | 107⅜ | 324 shs | Penna R | |
| 200 | do | 107½ | 100 | do | |
| 2300 | do | 107½ | 1330 | do | |
| 4000 | Lehigh 6s 1884 | 102 | 9 | Leh Val R | |
| 8000 | P C & St L 7s | 77¼ | 6 | do | |
| 1000 | Lehigh 6s c ln | 96 | 99 | do | |
| 2000 | Rdg R g m 7s c | 107⅜ | 150 | do | |
| 1000 | Alle Val 7-30s | 93 | 8 | Reading | |
| 2000 | Lehigh 6s g ln | 102 | 100 | do | |
| 5-10 | Leh Val rec | 61 | 46 | do | |
| 2 8-10 | Leh Val allot | 60½ | 40 | U Cos of | |
| 100 shs | Phil & Erie | 20⅞ | 3 | Hestonville | |
| 10 | Leh Nav | 50¾ | | | |

**Average Daily Consumption of Water per Head of Population.**

The appended table will prove to be interesting as showing the average daily consumption of water in Philadelphia per head of population, and the increase of the daily average consumption by periods of years from 1810 to 1874:

| Year. | Population. | Galls. Water per day average throughout the year. | Galls. per Head of population per day. |
|---|---|---|---|
| 1810..... | 96,664 | 757,925 | .8 |
| 1820..... | 119,325 | 1,537,200 | 12.8 |
| 1830..... | 167,811 | 3,074,644 | 18.3 |
| 1840..... | 225,359 | 4,922,257 | 21.8 |
| 1850..... | 408,763 | 7,432,237 | 18.1 |
| 1860..... | 565,592 | 27,345,176 | 48.1 |
| 1870..... | 173,726 | 37,149,385 | 55.1 |
| 1871..... | 690,000 | 37,631,379 | 54.5 |
| 1872..... | 704,000 | 37,583,594 | 53.4 |
| 1873..... | 718,000 | 40,276,184 | 56.1 |
| 1874..... | 732,000 | 42,111,760 | 57.5 |

[NOTE.—On some days in July and August the consumption is seventy to seventy-five per cent. greater than the daily average for the whole year. Thus in 1870, when the general daily average was fifty-five gallons, the consumption per head of population on the 20th of July was over ninety-two gallons.]

1874

Abt 65 gallons in 1876.

N.Y. has now an available daily supply (1880) of 95 million gallons.

London, 98 million gallons.

N.Y. has 277 miles of sewers!

Mineral —

Sea Water. (Over 300 gr. saline subst. in a pint)

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On ship-board, customary (men of war at least) 1 gallon per man of water allowed daily — 1/2 of it going for cooking (A. L. Gihon).

35 GALLONS PER HEAD.

Including clothing, 16 gallons per head are supplied to each person. The average gallons more. In the baths of ancient Rome allowed. In hot gallons are allowed. There are of course different kinds of water.

ROMAN BATHS

DISTILLED WATER.

The purest ~~in one respect~~ is distilled water. But it lacks salts, air. It is not pure in the sense of wholesomeness. ~~Spring water is very good~~ has its composition ~~is the same as that of the serum of the blood~~. When there is no other kind to be had, as at sea, distilled water may be used. If it is passed through charcoal and aerated it is much improved.

SPRING WATER.

DISTILLED.

RAIN.

Rain is purer than many waters but has ~~many~~ foreign substances. It contains besides air & free oxygen, carbonic acid, carbonate of ammonium, nitric acid (especially in summer), ammonia, and sulphuric & sulphurous acids. The latter two are particularly present in cities where coal is burnt.

CONTENTS.

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d street, at 2½ o'clock, precisely. The interment will be at Cambridge, Md., on Friday afternoon.
**
PERKINS.—On the 15th inst., GEORGE PERKINS, aged 27 years.
The relatives and friends of the family are respectfully invited to attend the funeral, this (Wednesday) afternoon, at 1 o'clock, from his mother's residence, 1159 South Tenth street. To proceed to Mount Moriah Cemetery.
PICKERING.—Suddenly, on the 16th inst., JOS. PICKERING, in the 82d year of his age.
The relatives and friends are respectfully invited to attend his funeral, on Friday, 19th inst, at 2 o'clk, from the residence of his grandson, John T. Monroe, 1024 North Sixteenth street.
***635
PLATT.—On the 14th inst., PHŒBE A. PLATT, aged 83 years.
The relatives and friends of the family are respectfully invited to attend the funeral, this (Wednesday) afternoon, 17th inst., at 2 o'clock, from the residence of her son in-law, Mr. Willet Weeks, No. 224 Main street, Frankford. To proceed to Cedar Hill Cemetery.
POMEROY.—On Sunday, 14th inst., RICHARD POMEROY, in the 54th year of his age.
His relatives and friends are invited to attend the funeral, from his late residence, 1936 Mervine street, on Thursday next, 18th inst., at 3 o'clock.
**
QUIGG.—On the 16th inst., MARGARET QUIGG, aged 75 years.
The relatives and friends of the family are re-

Varieties

Distilled

Rain

Melted

Melted

Spring

Well

River

Mars

Sea Water.

**Average Daily Consumption of Water per Head of Population.**

The appended table will prove to be interesting as showing the average daily con-

THE American allowance for water consumption is rather high. It varies from 40 to 80 gallons per day to each individual of the population—that is to say, from one to two barrels. In London the amount varies in different parts of the city, from 22 gallons to 34 gallons per head. In Liverpool it is 30 gallons, in Derby 14 gallons, in Norwich 12 gallons, in Glasgow 50 gallons, in Edinburgh 35 gallons, in Paris 31 gallons, model lodging houses in London, 7 gallons. In 1873 the January consumption in Brooklyn averaged 28,000,000 gallons per day, more than 62 gallons to a population of 450,000. In July the consumption was 26,800,000 gallons, an average of 60 per day. For the year 1873 the average was 25,000,000 gallons per day. During the past January consumption one day rose to 38,000,000 gallons, and for a week averaged 32,000,000, or on the same basis of population, respectively 80 and 70 gallons. The daily amount consumed per week was 2,000,000 gallons in excess of the pumping capacity of the reservoir.

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35 GALLONS PER HEAD.

Including cleansing and clothing, 16 gallons per head should be supplied to each person, and for sewerage 9 gallons more, making 25 to 30 gallons.

ROMAN BATHS.

In the baths of ancient Rome, 300 gallons were allowed. In hospitals from 40 to 50 gallons are allowed per head.

DISTILLED WATER.

There are different kinds of water. The purest in one respect is distilled water. But it lacks salts, & air. It is not pure in the sense of wholesomeness. Not always necessary pure: (See Barral's paper)

SPRING WATER.

~~Spring water is very good as its composition is the same as that of the serum of the blood.~~

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In some towns in different parts of the United States, for want of good fresh running waters, rainwater is systematically used. I drank it every day for a week in 1872 in Dubuque, Iowa. There many of the residents have tanks on their houses to collect it. It runs down in pipes through filters, — & when iced, is very good.

End of 8th Lecture 1867

Venice chief rainwater Supply.

New Orleans ?

* I have found city-snow-water to cause headache; because of
probably it is the ammonia in it there.

CONTENTS.

Hydrochloric
~~Muriatic~~ acid and chlorides of calcium, ~~ou~~ ~~ides~~ of animalcula, living animalcula, parts of flowers, and undefined nitrogenous matter, are all in it. It should be used only when there is no other to be had; but much is best in the country.

CHOLERA. ~~In cholera we should use water free from substances of the soil.~~

ICE Melting ice produces a less saline water than ordinary water. In freezing, water ~~frees~~ itself gradually of all salt.

NO SALT. Even frozen sea water is generally free from salt. This self-purifying power is seen in the Glaciers of Switzerland on a large scale. There is little or no air in ice. It is not as good as common water for drinking.

SNOW. Snow water is the same as rain water, ~~with less ammonia in it.~~ The common opinion is that it is unwholesome. It sometimes causes headache, ~~we know not why~~. In Northern Europe it does more injury.

DISEASE IN NORTHERN EUROPE. In the villages of Finland, for example, every kind of filth is thrown on the snow and it becomes impregnated with it. The people then use this snow for drink, and consequently disease is caused. It is no wonder

1744

Good spring water has an average composition very nearly the same as that of the serum of the blood, minus its albumen. It is a dilute solution of nearly the same salts; have, however, but little of the more, if the phosphates — which we get from solid food.*

Likewise, typhus typhoid fevers are believed by many physicians, especially in England, to be transmitted by drinking water, contamination of

Croton water epoch — or keeping

Croton aqueduct

larger even
therefore, that cholera ~~is known~~ in such
a Northern climate, sometimes the year round.

SPRING, WELL, & RIVER.

The most important waters to consider
are spring, well, & river water. The im-
portance of good water to drink is now better
appreciated than formerly. There has
been much said of the mode of extension of cholera
by water. Dr. Snow of England attributed
its propagation, to water impregnated with
excrement of cholera patients. Dr. Pettenkofer of Munich makes more
account of the water coming through the
earth. It is impossible to deny the
facts. ~~The fact that water is so important is illustrated by the fact that~~ It
becomes a great question, how is good
water to be supplied in abundance?

THEORIES AS TO THE CAUSE OF CHOLERA BY WATER.

LONDON.

In London, they are constructing aqueducts bringing water from
Wales, & proposing to have large reservoirs to col-
lect water for town supply. Has not a similar plan been ancient Rome & Syracuse N.Y.
compartively

SCHUYLKILL

Our water is, as yet, quite good, but
it seems, however that a time may come
when we will need other sources of water.

another, given up after use.

Expended 2d one, used.

Louisville Ky, 2086 ft deep
St. Louis Mo, ~~2000 ft~~ in 1869 over 3700 ft —
Columbus Ohio, 2575 ft. with Salt. stopped.

200 000 000 gall. daily
Present flow
St. Louis
3-4 Feet

Artes. wells in Desert of Western N. America

Deepest non-Artesian well drains a circle
ground of ½ mile radius.

Paris also has similar anticipations: the Seine, Oise & Marne already turned on insufficient supply of water.

"Driven wells" Atlantic City &c.
(Centrifugal suction)

WWS 1886 Summer

SCHUYLKILL WATER.

Even now
the water.
while, it
has also much
will prob
aware, or
the Del-

ARTESIAN WELLS.

Artesi
to be the
a great depth,
cess of so
is alkal
iron in
high.
some pur
of the
1849, whe
was not a
This was
contaminated
At the
wholesome
of natural
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EFFECT ON CHOLERA.

MARSH WATER.

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ter. It
n 50 grains
r in gallon.
me and

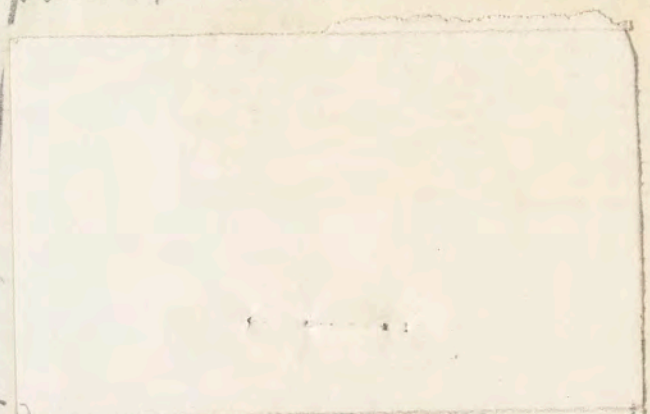

for sixty day s Sterling ... the last man
a 109¾.

firm. Bacon is quiet. Cutmeats are firm. Lard is steady.

cert, opera, symphony, and oratorio of the poor.

IF YOU ARE TROUBLED WITH A SLIGHT COUGH, Hoarseness or Sore Throat, you may save the expense of a doctor's bill by using at once Dr. Jayne's Expectorant. A neglected Cold often terminates, through much suffering, in Consumption. A slight inflammation of the lining of the wind-tubes, the usual symptoms of which are a Sore Throat, or a Pain in the Breast, will, if not properly attended to, frequently lead to Bronchitis. Even as a matter of economy, to say nothing of comfort, or the danger to pulmonary and bronchial organs, act prudently with your Cold, and by resorting to a standard remedy—the Expectorant—in time save money and escape more serious trouble. Sold everywhere.

another, good water use.



In North Wales at source of River Wye — (when the wells proposed to tap for London are available 12 mil/sq 60 are annually.

200 cases full. Daily

Proposed for London

St. Louis

Columbus Ohio, 25775 M.

Syracuse

St. Louis etc., 2086 M. daily

Columbus Ohio, 25775 M.

Deepest non-Artesian well drains a circle of ground of ½ mile radius.

Artes. wells in deserts

Paris also has similar anticipations: the Seine, Oureq & Marne already turnish an insufficient water supply.

"Driven wells" Atlantic City &c. (Condemned subsequently)

SCHUYLKILL WATER.

ARTESIAN WELLS.

EFFECT ON CHOLERA.

MARSH WATER.

a 109⅝.

Gold is without change. The premium has, it anything, an advancing tendency, under an active demand from the importers, and the steadiness of foreign exchange. At 10 A. M., 134⅜; 11 A. M., 134½; 12 M., 134⅜; 1 P. M., 134⅜; 2 P. M., 134⅜; 3 P. M., 134⅜; 4 P. M., 134⅜; 5 P. M., 134⅜.

A fair business was done in stocks this morning. Under free sales of Erie the price declined 1⅛ per cent., and this had a depressing influence upon the rest of the railways. The steamship shares and Missouri bonds were firmer. In Governments there was not much activity, but prices were steady. The conversions at the Sub-Treasury continue large. Annexed are the closing quotations:

Registered, 1881, 109 a 109⅛; coupon do., 109 a 109⅛; 5-20s, reg., 1862, 107 a 107⅛; do. coup., do., 109⅛ a 109⅜; 5-20, 1864, 107⅜ a 107⅝; 5-20 coup. 1865, 107⅜ a 107⅝; 5 20s, 1865, new, 107a 107⅜; 10-40s, coup., 97⅝ a 97⅞; 7 3-10 notes, first series, 106 a 106⅛; do. do., second series, 105⅛ a 105⅜; do do., third series, 105⅛ a 105⅜.

After the Second, and at the last open Board, the market generally had a firmer tone. An exception was Pittsburg, which fell to 78⅛. The mining shares for the most part were active, though at lower prices. The following are the closing prices in the street at 5 P. M.:

Ohio & M. C., 26¼a¾; Canton, 46¾a47; Bost. W. P., 25¾a26; Cumb. pref., 32¼a33¼; Quicksilver, 36a37; Mariposa, 8¼a¾; do. pref., 22½a23. Western U. Telegraph, 41 a 42; New York Central. 105⅝ a 105¾; Erie, 58⅛ a 58⅜; Hudson River, 137¼ a 138; Reading, 101⅛ a 101½; Mich. Cent., 108 a 108⅛; do. Southern, 74⅜ a 74⅞; Ill. Cent., 115¼ a 115½; Cleve. and Pitts. 78 a 78¼; Cleve. and Tol., 118⅛ a 118¾; Rock Island, 96⅜ a 96⅞; Northwestern, 35½ a 35⅝; do. pref., 64⅛ a 64¾; Fort Wayne, 96⅛ a 96¾.

FLOUR.—State and Western Flour is 5 a 10c. better. Southern flour is firm. Rye flour is firmer, at $7 50 to 8 30. Corn meal is quiet.

GRAIN.—Wheat opened quiet, and closed more active and firm. Corn is 1 a 2 cts. lower. Barley is firm. Barley malt is dull. Rye is quiet. Oats are heavy.

PROVISIONS.—Pork opened dull and closed firm. Bacon is quiet. Cutmeats are firm. Lard is steady.


can only be gratified in the humble through the agency of the barrel organ, which is the concert, opera, symphony, and oratorio of the poor.

IF YOU ARE TROUBLED WITH A SLIGHT COUGH, Hoarseness or Sore Throat, you may save the expense of a doctor's bill by using at once Dr. Jayne's Expectorant. A neglected Cold often terminates, through much suffering, in Consumption. A slight inflammation of the lining of the wind-tubes, the usual symptoms of which are a Sore Throat, or a Pain in the Breast, will, if not properly attended to, frequently lead to Bronchitis. Even as a matter of economy, to say nothing of comfort, or the danger to pulmonary and bronchial organs, act prudently with your Cold, and by resorting to a standard remedy—the Expectorant—in time save money and escape more serious trouble. Sold everywhere.

LONDON ARTESIAN WELLS.—Mr. W. Austin, civil engineer, would save the people of London the expense of bringing water for their use from the lakes of Cumberland and Westmoreland or from North Wales, by establishing a system of artesian wells on a large scale, which should reach the lower green sand basin which underlies London, and furnish a supply of wholesome water sufficient for 10,000,000 of people. He proposes, by means of an improved system of telescopic artesian wells, to pierce the stratum, which he believes to contain an unlimited store of the purest water, which had fallen as rain and soaked down to the lowest dip of the sand. The wells would be 2000 feet deep, each one costing about $100,000, and delivering 4,000,000 gallons in twenty-four hours, so that, with fifty such wells, 200,000,000 gallons could be raised daily. An experimental well might be sunk for about $50,000.

Various objections must be made to this plan of obtaining a water supply for drink and household purposes, on the ground, first, on the not improbable coming up of water with a large saline impregnation, as in the case of the great well at Louisville; and secondly, of the water being so warm as to render it unfit for drink, as in the well at Grenelle, near Paris. And, again, all the wells sunk would be drawing on the same reservoir. As the case now stands, there is a progressive depression of the water level in the deep springs under London which has been taking effect for a period of many years. In ten of the principal wells in London a depression of more than two feet per annum has been noticed. Would not the supply be still more rapidly deficient by so large an additional exhaustion as would come from a hundred and twenty wells, the number proposed for supplying London?

(Last on page)

Another plan proposed is to economize the drinking water by constructing reservoirs for rain water to be used for washing &c only. For

Deepest non-Artesian well drains a circle of ground of ½ mile radius.

Paris also has similar anticipations: the Seine, & Marne already turned on to supply good water.

Artes. wells in deserts

Artesian wells

Louisville Ky, 2086 ft deep
St. Louis Mo, 2199 " " 1847 over 3700 ft. —
Columbus Ohio, 2575 ft. with salt water, supply

Chinese, 1000 yrs old have Artes. wells
10 gallons per day!

Dover wells
Atlantic City &c.
(Coastwise intrusion)

SCHUYLKILL WATER.

Even now, the water has while, it has also much ca will probably aware, or

ARTESIAN WELLS.

Artesian-w to be the very great depth, it is ess of saline is alkaline a iron in it. high. It has

EFFECT ON CHOLERA.

some purposes i of the Lunatic 1849, when chol was not a sin This was ow

MARSH WATER.

At the wholesomeness, contains from of decayed veg This is always

ceases to be ... When the last man whistles a popular melody? The same mystery enshrouds him as attaches to dead dominkeys, the which, it is popularly believed, have never been seen of man. And yet there must exist such a being. But when he, too, has deserted the neglected air, it breaks forth again in a new form, and acquires a fresh lease of life through the agency of the barrel organ, and is listened to with a pleasure akin to that which hailed its first appearance; and through this agency it long remains a welcome friend.

It would doubtless be a matter of great surprise if we could possibly know the amount of good that is performed by these abused and much-maligned instruments. No one can have failed to observe the attention they attract whenever they pour forth their strains in the humbler quarters of the city. Children crowd about them with wonder and delight, windows are thrown up and women's toil-worn faces are moved to pleasure; while rugged men stop on their way and for a moment forget the cares of life. The best points of our common nature are brought out, too, in connection with these humble ministers of music—children learn to sympathize with poverty, and it is touching to observe with what eager satisfaction the offspring of the poor bestow their mite upon the organ-grinder if a child accompany him on his way. The poor feel for the poor; and it is from those on whom fortune has refused to smile that the street musician reaps his largest harvest.

There is much complaint against the barrel organ, and every now and then an effort is made to put them down, but it would leave a gap in the enjoyments of the poor, and they have but few enough, that could not be easily filled. If they really be the annoyance they are charged to be, yet it would be kindly to bear with them, for through them a spirit of charity, of sympathy and of tender feeling is perpetuated that would lie dormant were they not to bring it into active play. The love of music is one of the strongest sentiments of the human heart, and while the rich can gratify it by their operas and their concerts, it can only be gratified in the humble through the agency of the barrel organ, which is the concert, opera, symphony, and oratorio of the poor.

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# IRRIGATION OF THE PLAINS.

## The Artesian Well System.

The efforts of the delegates from Wyoming territory to secure an appropriation for an artesian well at Fort D. A. Russell, recalls the attention given to this subject before the war. In 1855 it was determined to sink artesian wells in the plain of Llano Estacado, lying between Missouri and Arkansas on the east and Mexico on the west, the object being to secure a direct route to the far southwest, several hundred miles shorter than any then open. Captain Pope was appointed leader of the enterprise. He sunk two wells near the Pecos River, at the thirty-second parallel, to the depth of 641 and 869 feet respectively. The result was satisfactory, it being evident that water could be supplied in abundance for purposes of cultivation. The work was relinquished for want of means, and further appropriations by Congress were expected when the war broke out.

The effort to make the desert bloom by means of these wells has been followed by some success in Sahara, in some parts of which the natives, originally, and afterwards the French, produced artificial oases as frequent resting-places for travelers. Tedious as cultivation under artificial irrigation seems to the American, the results attained in Europe and Asia are such as to warrant our people in making considerable expenditures for the sake of recovering the far-western plains from the tough wild grasses which now monopolize them. Palestine furnishes the most encouraging examples, perhaps, where on a side hill a narrow irrigating ditch separates barren sands from the luxuriance of Oriental gardens. There are many thousands of square miles in our western Territories where such a result can be obtained only by artesian wells. Wyoming is not within the belt of country where the experiments referred to were made, being far to the north of that line, most of it north of the Union Pacific Railroad line Though there is considerable mountainous country in the territory there are many miles of plain, covered, as we understand it, with a hardy grass useful to cattle and giving promise of great fertility in the soil. The delegate, Mr. Jones, claims that the government needs a well to furnish water for the garrison of Fort Russell, and that if it is proved that the underlying rock of the territory is favorable to artesian wells private persons would gladly sink them. At present the experiment is very doubtful. An appropriation of $10,000 is requested. Of course private enterprise will do the work as soon as its success is assured.

The amount of water furnished by artesian wells is sometimes enormous, one well giving sufficient to irrigate the country for miles around, though it is yet doubtful whether or not these very prolific wells could be secured where they are most needed. The Grenelle well at Paris flows at the rate of 500,000 gallons in twenty-four hours, the diameter of the shaft varying from 7½ to 12 inches. It is 1,806 feet in depth. The Kissingen well, 1,878 feet deep, 4 inches in diameter, discharges more than 1,000,000 gallons in a day. The well at St Louis, 2,199 feet in depth, the deepest in the world. furnishes about 108,000 gallons per day. Its cost was somewhat more than $20,000.—*N. Y. Post.*

~~Water Supply~~ 1869 ~~It~~ became very scanty for a time, after a tremendous flood.

SCHUYLKILL WATER.

Even now, ~~in~~ a hot Summer ~~day~~, when the water has remained drawn for a while, it acquires an odor and taste. It has also much earthy matter in it. We will probably have to resort to the Delaware, or some remoter source, before many years. ~~Deep well water best.~~

ARTESIAN WELLS.

Artesian-well water would be thought to be the very best. Coming from a great depth, it is very pure from organic matter, but has an excess of saline substances. Sometimes it is alkaline and it often has much iron in it. The temperature, also of many deep wells, is too high. It has a deficiency of air. For some purposes it is very good. In one of the Lunatic Hospitals of London, in 1849, when cholera was raging, there was not a single case of the disease. This was owing to the fact that it was supplied by an Artesian well. At Grenelle, Paris.

EFFECT ON CHOLERA.

MARSH WATER.

At the ~~worst~~ extreme of unwholesomeness, of natural drinkable waters, is marsh water. It may contain from 12 to 40, or even 50 grains of decayed vegetable matter in a gallon. ~~Of animal~~ This is always unwholesome and

end of the United States army in Mexico in 1847 — as
about 1864, 5
regards troops in that country in the war, which ended
all as of the French with Maximilian's defeat & destruction.

Sewers are as bad or worse, in their influence.
e.g. in Philadelphia.
Brood of pumps
One famous pump
Broad St. pump created with 600 deaths in children.
So in country too, sometimes, no doubt.
Bad water & place of

Sewers or privy contaminated water
Contains, besides organic matter, salts of ammonia, nitrates
nitrites & butyrates, especially of lime.

Yet, if typhoid fever is ever, as some
insist, only extended by fecal con-
tamination, how can any city which
has privies, water closets, & sewers emptying
into the rivers, ever be free from it?

sometimes serious
causes injury to the health. This was
one of the causes of the mortality
ARMY OF POTOMAC. of the Army of the Potomac, during the late war.

Another very bad kind of water, is
GRAVE YARD WATER. such as comes through grave yards. It
contains decayed animal matter. It
is impregnated with nitrates and ni-
trites of ammonia and lime, fatty acids,
& undefined nitrogenous matter.
Such water in England contains 10⅔ grains
per gallon, of animal matter.

FACTORIES. Water passing near factories, be-
comes contaminated. This makes it
injurious, especially if the article
ARSENIC. be arsenic, which is used in calico
manufacturing. Some years ago, the
GERMANTOWN. people of Germantown were troubled
by dye stuffs getting into the water.

No article should be allowed
to enter drinking-water if it will
injure it. Hence, gas works, slaugh-
ter houses &c. ought to be interdicted.
SCHUYLKILL Even the Schuylkill water has been in
danger from this cause.

River Water,

Ganges, solids, 194 parts in 100,000 parts,
Mississippi, 60 & 80 " "
Seine at Paris, 20 to 50 " "
Rhine, 20 " "
Thames at London, 20 to 35 " "
(16 & 30 gr. per gallon)
Croton Water, N. Y. 6 3/3 "
(4.78 grs per gallon)
Schuylkill, at Fairmount, 10 & 20 "
(3.5 gr. per gallon)
Lake Michigan, Chicago, 6.68 gr. per gallon
Cochituate, Boston, 3.11 gr. per gallon

To Chicago, 2 miles

55 gr. carb. soda
& 70 chlor. sod. per gallon
give no taste; neither do
10 gr. carb. lime; &
25 sulph. of lime very little.
Parkes

In the supply of water to Marseilles there is Silicious matter finely divided — in abundant as to stifle vegetation in irrigated soil.

DIARRHŒA.

RIVER WATER SHOULD BE TAKEN FROM THE MIDDLE.

position of vegetable matter, it goes to the sides. In lakes, the same rule applies.

CONTENTS OF RIVER WATER.

As to the contents of river water, a few words may be said. The quantity of solids perceptible to the eye, is great. The Ganges contains 194 parts in 100,000; the Mississippi 59 to 80 in 100,000; the Rhine, 20 in 100,000. These suspended particles are not as injurious as is supposed. They do not even make the water taste bad. The Nile water, compared with ours, is mud. Habit makes one accustomed to it. Those who drink Nile water would think ours very flat, just as we

SOLIDS.

GANGES

MISSISSIPPI

RHINE

NILE

London water contains 19 to 35 parts in 100,000 of "impurity" (~~organic~~)

Paris 24 to 46 — Croton for N. York but 6.66. (Peters on Cholera, p. 46).

Harrisburg, 1871-2, — had much diarrhoea from sewer-contaminated drinky water, derived from the Susquehanna.

River Waters,

Ganges, solids, 194 parts in 100,000 parts,

Mississippi, 60 to 80 " "

Seine at Paris, 20 to 50 " "

Rhine, 20 " "

Thames at London, 20 to 35 " "
16 to 30 gr. per gallon

Croton Water N. Y., 6 3/4 "
4.78 gr. per gallon

Schuylkill, at Fairmount, 10 to 20 "
(3.5 gr. per gallon)

Lake Michigan, Chicago, 6.68 gr. per gallon

Cochituate, Boston, 3.11 gr. per gallon

Chicago, 2 miles

55 gr. carb. soda
& 70 chlor. sod. per gallon give no taste; neither do 10 gr. carb. lime; & 25 sulph. of lime very little.
Parkes

Sewage, Liquid, Organic

In the supply of water to Marseilles there is Silicious earth finely divided — in abundant as to stifle vegetation irrigated with it.

e.g., Kensington water-works — margin of Delaware.

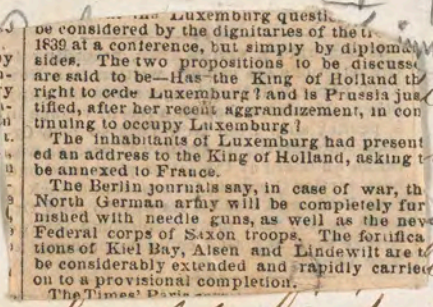
DIARRHŒA.

Our extended

It is promoted by

It is too

When


be considered by the dignitaries of the t... 1839 at a conference, but simply by diplomat... sides. The two propositions to be discuss... are said to be—Has the King of Holland th... right to cede Luxemburg? and is Prussia jus... tified, after her recent aggrandizement, in con... tinuing to occupy Luxemburg?
The inhabitants of Luxemburg had present... ed an address to the King of Holland, asking t... be annexed to France.
The Berlin journals say, in case of war, th... North German army will be completely fur... nished with needle guns, as well as the nev... Federal corps of Saxon troops. The fortifica... tions of Kiel Bay, Alsen and Lindewilt are t... be considerably extended and rapidly carrie... on to a provisional completion.
The Times' Paris

immense advantage

Diarrhœa is promoted by river water

RIVER WATER SHOULD BE TAKEN FROM THE MIDDLE.

When used from a river it should be taken from the middle, Shipping merchants follow this practice because the water keeps better. In the diffusion and decomposition of vegetable matter, it goes to the sides. In lakes, the same rule applies.

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SOLIDS.

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GANGES

194 parts in 100,000;

MISSISSIPPI

the Mississippi

RHINE

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NILE

Nile water, compared with ours, is mud. Habit makes people accustomed to it. Those who drink Nile water would think ours very flat, just as we

London ... 9 to 35 (organic?)

Paris ... otor for

N. York ... Peters on Chol...

p. 46).

MISSISSIPPI RIVER WATER, according to the letter of a sea captain written to a New York paper, will keep longer at sea than any other. He states that on a recent voyage in a packet ship from New York to New Orleans, the passengers drank water which was taken on board at the latter place, and had been carried thence to Liverpool and back to New York, and was on its way to New Orleans again, still more wholesome for the voyage than any that could be procured at New York.

Harrisburg, 1871-2, — had much diarrhoea from sewer-contaminated drinking water, derived from the Susquehanna.

River Water,

Ganges, solids, 194 parts in 100,000 parts,

Mississippi, 60 to 80 " "

Seine at Paris, 20 to 50 " "

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(16 to 30 gr. per gallon)

Croton Water, N. Y. 6 2/3 "

(4.78 gr. per gallon)

Schuylkill, at Fairmount, 10 to 20 "

(3.5 gr. per gallon)

Lake Michigan, Chicago, 6.68 gr. per gallon

Cochituate, Boston, 3.11 gr. per gallon

Chicago, 2 miles N

(55 gr. carb. soda
& 70 chlor. sod. per gallon
give no taste; neither do
10 gr. carb. lime; &
25 sulph. of lime very little.
Parkes)

Dumpings (sewage, hospitals, &c.)

In the supply of water to Marseilles there is silicious earth finely divided — to abundant as to stifle vegetation irrigated with it.

e.g., Kensington water-works — margin of Delaware.

river extended Park will be of immense advantage (Sometimes)

DIARRHŒA.

It is probable that diarrhœa is promoted & in children by our river water. It is too concentrated, especially (sometimes) when dry weather

RIVER WATER SHOULD BE TAKEN FROM THE MIDDLE AND

When water is supplied from a river it should be taken from the middle, (only two feet or less below the surface.) Shipping merchants follow this practice because the water keeps better. In the diffusion and decomposition of vegetable matter, it goes to the sides. (Slow) In lakes, the same rule applies. (Stirred water sinks to bottom)

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GANGES

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MISSISSIPPI

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NILE

Nile water, compared with ours, is mud. Habit makes us accustomed to it. Those who drink Nile water would think ours very flat, just as we

End of 23d Lecture, 1872.

1869?

Nichols, 1872, Fairmount Dr.
Solids, 7.29 gr. in gallon;
4.67 inorgan.
2.62 organic.
Horsford, Seventh passage,
Solids, 3.50 gr. in gallon;
2.30 inorgan.
1.20 organic.

Signs of excess of organic matter in water:

1. Smell & taste after keeping a few days; also, precip. tinct. of chloride of gold.
2. Decolorizing permang. potass. solution:
3. Presence of nitrite of ammonia (& sometimes SH) or chemical analysis; also, but less distinctive, $CO_2$ & salts.
4. Large number of infusoria or fungoid minute vegetations, discovered by aid of microscope.

think of

COLOR. The

determine

matter.

IN THE WHITE MTS. White M

through

FARM-YARD. ~~water,~~

~~Sewage~~ matter

smell o

some

TOUCH. The

quantity

HARD WATER. is called

lather

of hard

The fo

of carb

the carb

latter d

chloride

is now

entific measure of the quantity of saline substances. Hydrotimetry

THE SOAP TEST.

~~Sulphur waters decolorise~~

~~Permang. potash solutions, much~~

~~like organic matter~~

For quantity of organic matter in waters:
Add a measured quantity of sol. carb. soda of known strength; add this to known quantity of the water, & evap. in platinum dish on water bath. Expose residuum to 248°-260° ~~bath~~ or oil bath, till ceases to lose weight. Now weigh, & subtract weight of dish and carb. soda, for amount of solid residue in the water. Next heat dish & residue to dull red heat to destroy all organic matter. When cool add sol. carb. acid, & again dry until weight is constant. The difference between this last weight and that before ignition represents the amount of organic and other volatile matter present.

Dr Procter, T.C.S., York.—
Lond. Med. Times & Gazette, Sept. 8, 66.

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End of 23d Lecture, 1872.

(Organic Impurities of Waters).

Often sparkling deceptively, from $CO_2$.

waters have more animal vegetable

alkaline, impurities;

acid, fungoid vegetations.

Even granitic waters 0.3 to 0.7 gr. org. matter per gallon from soil.

An invariable result of animal putrefy. is ammonia.

Of Veg., Hermann gives list of 10 substances.

Mulder names

| | | | |
|---|---|---|---|
| Humic acid | $C_{40}$ | $H_{12}$ | $O_{12}$ |
| ulmic " | 40 | 14 | 12 |
| Crenic " | 40 | 17 | 17. |

also Crenic & Apocrenic "acids" – half sulph. & salts.

Deposit non-artesian well draws circle of ½ mile radius.

Iron pipes aid in de-organizing water, by oxidation.

Soil & ammonic acts as a filter.

over

Nichols, 1872, Fairmount W.
Solids, 7.29 gr. in gallon;
4.67 inorgan.
2.62 organic.
Horsford, Somerville supply
Solids, 3.50 gr. in gallon;
2.30 inorgan.
1.20 organic.

1868?

Signs of ex- matter i
1. Smell
2. Decolor
3. Presen on
Lane fung die

oxide of gold.

think of distilled water.

COLOR. The color of water determine the amou matter. Heat colors White Mts. is reddis through the fronds of FARM-YARD. water, though cont matter does not give smell or taste unles some time.

TOUCH. The touch will of quantity of saline su

HARD WATER. is called hard water, will not make a lather with soap. There are two kinds of hardness, removable & permanent. The former depends on the presence of carbonate of Calcium. By boiling, the carbonic acid is driven off. The latter depends on sulphate of lime & chloride of calcium. The soap test is now used in France as a scientific measure of the quantity of saline substances.

THE SOAP TEST.

...OLDERS—Developments...
...ny's estate in Wirt county, West Virginia, p...
the existence of an immense vein of Antimony (ype metal) a sample of which has been forwarded, ed can now be seen at the Company's office. This ntimony has been examined by competent chemists, and pronounced to be an article of rare purity. New York and Philadelphia houses will now contract with this Company for deliveries as $350 per ton, cash.

As the above discovery was wholly unexpected, and as it infuses a new wealth into the Company the undersigned experience very great pleasure in communicating it to their friends

Should the yield of Antimony equal present appearances our income from this source alone will equal that of any Oil Company in Pennsylvania

The Company's Oil developments are going vigorously forward, and profitable returns may be early looked for. A very small amount of original Stock, at $1 per share, now remains untaken, and no subscriptions will now be received unless accompanied with cash. Names of subscribers not promptly paying will be erased, and the stock transferred to cash applicants.

HENRY SIMONS, President.
WM. H. WEEKS, Treasurer.
J. PERCY DIX, Secretary.
Company's Office, 434 WALNUT Street. fe6 3tr

McELHENNY COAL AND OIL COMPANY
—Organized January 3 d, 1865
CAPITAL, $60,000 SHARES, $1.

12,500 shares subscribed by the owners of the land.
20,000 shares are reserved for sale for the present.
27,500 shares to be subscribed by the public at par, whereof $17,500 will be working capital of the Co.

This Company has purchased in fee simple a tract, one hundred and twenty-one acres, of Coal and Oil Land, eligibly situated, near French Creek, within two miles, westwardly, from the Court House in the borough of Franklin, the county seat of Venango in the heart of the oil region of Pennsylvania.

The Mercer turnpike road and the Georgetown turnpike road pass across the middle and on one side of this tract from the town of Franklin. It is known that the quality of the Oil universally found around Franklin is of the best lubricating kind, it being worth $25 per barrel at the wells' mouth. Doyle's Run and another run of water on this tract are desirable locations for Oil Wells. This land is almost surrounded by numerous Companies.

There is a five feet thick vein of Bituminous Coal permeating through this ground, besides other smaller veins. The close proximity of this Coal to the city of Franklin, where it sells constantly at from one to two dollars upwards per bushel, renders the prospects of the Company highly encouraging, especially as the demand for Coal continues to be excessive in the vicinity of the Oil Regions. This five feet vein of Coal lies horizontally, near the surface of the ground, and can therefore be readily procured at a moderate cost to the Company.

The excellent improvements already erected on the ground are alone valued at $2000, currently ...

152

End of 23d Lecture, 1872.

Amusement.

*The Schuylkill Water—Its Impurities, &c.*—In September last, the quality of the water in the Schuylkill, from Reading to Fairmount dam, was examined by the Water Department, and the Chief, in his annual report, calls the attention of Councils to the subject. The report states that a large proportion of the impurities affecting the salubrity of the water of the Schuylkill is furnished by the drainage of the mines.

About six miles above Reading, the chemical action of the waters as they mingle can be distinctly seen. Analysis of the water at Schuylkill Haven shows 9.888 grains of sulphuric acid to the gallon, but is reduced to 2.652 at Reading, owing to streams through limestone regions flowing into the Schuylkill. At Fairmount, the amount of sulphuric acid in the water is found to be steadily increasing; in 1842, there were 1.302 grains to the gallon, and in 1854 1.418 grains. The other matter held in solution consists of magnesia and lime. The proportions are of magnesia 0.835 grains, and lime, 1.457 grains; these proportions are so small and harmless that they require scarcely a comment. One remarkable property in the water, at the dam, is the almost imperceptible amount of organic matter found in it. A large amount of objectionable water is constantly flowing into Fairmount dam—drainage from breweries, distilleries, gas, chemical and dye-works, paper and cotton mills, &c. Spent dye stuff, lime, ashes and waste materials, no matter of what kind, are either thrown directly into the river, or so placed that the first freshet will carry them off and deposit them in the lower portion of the dam. A great amount of this detritus is accumulated in the lower part of Fairmount dam, which, on account of the slow current, is rapidly filling up: thus destroying the great subsiding reservoir, so effectual for the depuration of the water supplied to the city. The taste of the dye-stuffs and other impurities is readily discerned as far down as the bridge at the Falls, and at times the river is discolored to this point. The contour of the river has undergone considerable change. Below the Columbia Avenue Bridge, the eastern shore has encroached upon the channel for 600 feet. Below the rolling-mill there has been a filling in of 3.0 feet, and at Girard Avenue Bridge the deposit extends 46 feet down the stream. The total deposits below Schuylkill Heights, since 1861, has been 789 694 cubic feet per annum.

Nichols, 1872, Fairmount W. Solids, 7.29 gr. in gallon; 4.67 inorgan. 2.62 organic. Horsford, Several passages. Solids, 3.50 gr. in gallon; 2.30 morgan. 1.20 organic.

Signs of ... matter. 1. Small ... 2. Decolor... 3. Presen... or

Mulder names

Humic acid — $C_{40} H_{12} O_{12}$

ulmic " 40 14 12

Ere " 40 17 17.

als. Crenic & Apocrenic "acids" — hard sugh... & salts.

Deposit non-artesian well drains circle ... mile radius. water, by oxidation.

Iron pipes aid in de organizes

Sol. Iron mic acts as a filter.

over

think of distilled water.

COLOR. The color of water does not always determine the amount of organic matter. Heat colors it. Water in the White Mts. is reddish from going through the fields of roots. Farm-yard water, though containing little organic matter is colored. Organic matter does not give the water a smell or taste unless it be kept for some time.

TOUCH. The touch will often determine the quantity of saline substances in water. What is called hard water, will not make a lather with soap. There are two kinds of hardness, removable & permanent. The former depends on the presence of carbonate of Calcium. By boiling, the carbonic acid is driven off. The latter depends on sulphate of lime & chloride of calcium. The soap test is now used in France as a scientific measure of the quantity of saline substances.

IN THE WHITE MTS.

FARM-YARD.

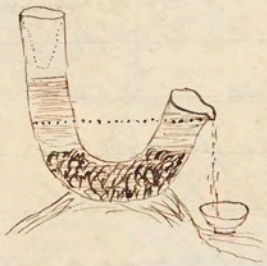
HARD WATER.

THE SOAP TEST.

Water is hard (Christison) when it has 1/4000 of saline matter, or 17½ gr. per gallon

Soap (salts) of calcium + magnesium are insoluble: alk. soaps sol.

(Parkes)



6 gr. of a lime salt per gallon give a turbidity with oxalate of ammonia; 16 gr. a precipitate.

4 gr. per gall. of chlor. sodium give turbidity with acidulated solution of nitrate of silver; ten gr. a slight precipitate. 3 gr. of sulphates per gallon give with chlor. barium a turbidity; more, a precipitate.

Parkes.

For magnesia — add ammonia; hazy if excess of magnesia

MICROSCOPICAL EXAMINATION

WELL WATER.

TESTS FOR WATER CONTENTS

2 qr.

Chloride of Gold
Precip. violet black

For Lime & its Salts,
Oxalate of Ammonium

For Chlorine,
$NO_3$ a pure Nitrate of Silver.

For Total Amount of Solids
Evaporation & weighing.

For Earthy Salts.
Soap Test. (Hydrotimetry)

Sulphur in water decolorizes permanganate
Mud like Copper Nitrous acid

& find amount of Nitrogen, Chlorine, Carbon & Sulphur.

over

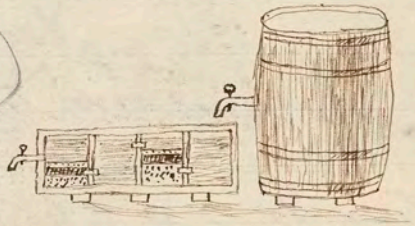
Water is hard (Christison) when it has 1/4000 of saline matter, or 17½ gr. per gallon

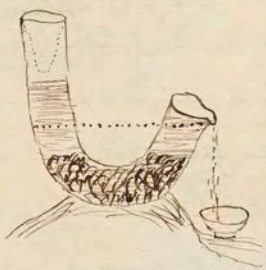
* Hydrotimeter of Boutron et Boudet—

a few drops (in a graduated burette) of tincture of soap; added to a vial of water — precipitated — foam or lather will not come until the lime & magnesia are neutralised; the quantity of soap required for this shows the hardness or softness of the water. 1 or 2—10.000 of Salines generally.

Soap (salts) of calcium & magnesium are insoluble; alk. soaps sol.

(Parkes)





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MICROSCOPICAL EXAMINATION

From microscopical examination, water is f… animal and vege… diatoms (veg.) …oria, water flea … la. A bunch of … from a certain hy… me out- In well w… worms, which gette… cause worms in … canal.

rial for stoves, says: 'Stoves of porcelain, or of wrought iron, are much to be preferred and have not the same disadvantages.'

"For all modes of escape for the gases of combustion through cracks, joints, and the various ways in which visible openings may be caused by unequal expansion, wrought iron, when bolted and made steam-tight, would appear to be a complete remedy. One of the cylinders which had been used for many years at the Asylum for the Blind, was recently removed to give place to one of still larger dimensions, and was found free of all defects, and apparently as good as when first set up.

"Iron of any kind will expand by heat and contract by cold, but wrought iron is an elastic material, and will bend before breaking. A furnace of

WELL WATER

## Lecture VIII.

## Tests of Water Contents

TESTS FOR WATER CONTENTS

For Organic Matter,
2 gr. in 10 oz. water strength Permanganate of potassium or tincture of chloride of gold

For Lime & its Salts,
Oxalate of Ammonium

For Chlorine,
Nitrate of Silver.

For Total Amount of Solids
Evaporation & weighing.

For Earthy Salts.
Soap Test. (Hydrotimetry)

Bladdown for

Sulphur in water decolorizes permanganate of potassium but like organic matter it does more, & nitrous acid

To find amount of Nitrogen, Chlorine, Carbon & Sulphur.

over

Water is hard (Christison) when it has 1/4000 of saline matter, or 17½ gr. per gallon

* Hydrotimeter of Boutron et Boudet

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tinct

of a

lath

lime

quantity

the hardness or softness of the water.

1 or 2 – 10 000 of salines generally.

Soap (salts) of calcium + magnesium are insoluble; alk. soaps sol.

A Simple Test for Drinking Water. — Herr Heisch, in a recent paper on the pollution of water by sewage, furnishes a very simple test to show whether water is fit for general use. "Good water," he says, "should be free from color, unpleasant odor and taste, and should quickly afford a lather with a small portion of soap. If half a pint of the water be placed in a perfectly clean, colorless glass-stoppered bottle, a few grains of the best white lump sugar added, and the bottle freely exposed to the daylight in the window of a warm room, the liquid should not become turbid even after exposure for a week or ten days. If the water becomes turbid, it is open to the grave suspicion of sewage contamination, but if it remain clear, it is almost certainly safe."

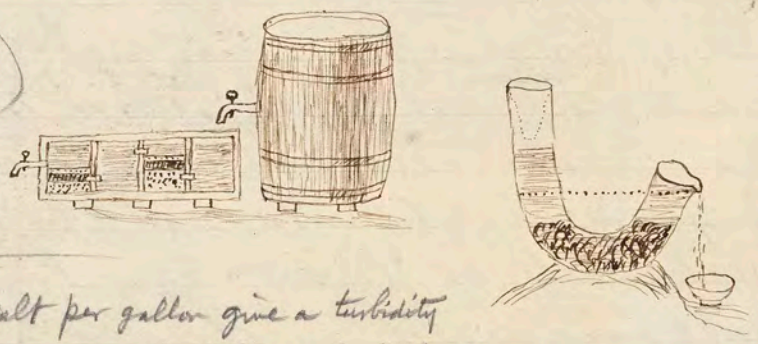
foam or

until the

tized; the

this shows

(Parkes)



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Parkes.

for magnesia – add ammonia, hazy if excess of magnesia

MICROSCOPICAL EXAMINATION

From microscopical examination, water is found to contain, animal and vegetable tissue, infusoria, diatoms (veg.) water flea and other articulata. A bunch of worms was passed from a certain hydrant; fish often come out. In well water, there are often worms, which getting into the body, cause worms in the alimentary canal.

WELL WATER

## Lecture VIII.

### Tests of Water Contents

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For Organic Matter,
2 gr. in 10 oz. water strength
Permanganate of potassium or tincture of chloride of gold

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Oxalate of Ammonium

For Chlorine,
Nitrate of Silver.

For Total Amount of Solids
Evaporation & weighing.

For Earthy Salts.
Soap Test. (Hydrotimetry)

To find amount of Nitrogen, Chlorine, Carbon & Sulphur.

over

Franklands finds that Johnstone's Flame is quite free to water to Carbon ; & suggests that the reason water passes the charcoal filters is that it contains a very minute trace of alkali, probably a little $CaO$ $PO_5$.

* for Sulp… use Solut… of nit… Barium :— …ate, white, —

for Petro… = pipe $SO_3$

; Add = … stand), dark olive … mixture join. Nitrates … ater.

for Nitr… or. potas. — 20 of stan… with a little acetic ac… lding Nitrites.

for Ammonia, Nessler's test : cor. potas., bichloride of mercury & caustic soda, or potassa, — united in definite proportions; this liquid becomes yellow or brown from ammoniacal salts ; if much, a brown precipitate. (albuminoid ammonia &c.)

In 1873 was announced the discovery by Dr. T. R. Lewis, in India of the filaria sanguinis hominis — the probable cause of chyluria, or "chylous Hæmaturia," — not uncommon in tropical countries. This blood-parasite is about .175 (nearly 1/5) mil. long, — with 1/3300 mch. Evidence makes it nearly certain that it exists also in S. America.

To know the law of organic matter in water — it is important to find how much ammonia, nitrous & nitric acids — excess of chlorides, & gases, especially $CO_2$ (Sulphur & sulphyd. of course)

Carbon & Nitrogen determined by Frankland & Armstrong's process. "Combustion" method Wanklyn, Chapman & Smith.

For Sulphates of nitrates

For Nitrates

For Nitrites

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SCHUYLKILL WATER WHOLESOME.

In mentioning so many foreign matters as being in the Schuylkill, it was not intended to depreciate it. It is better than that supplied to most large cities. The health of Philadelphia is proverbially good.

LEECHES &c. IN THE WATER.

Sometimes more considerable matters are in water. Many of Napoleon's soldiers in Egypt got hemorrhage from drinking water which contained small leeches. In Egypt and other tropical countries, there are other parasites infecting the water; thus, the Guinea worm, from 6 in. to 10 or 12 ft. long, which gets into the cellular tissue. Filaria Dracunculus — There is another kind which gets into the bladder & kidneys, especially the blood vessels of the latter: Bilharzia Hematobia.

BOILING AND FILTERING.

Protection against these animals is ensured by boiling or filtering.

The tests for matter contained in water are enumerated in the table at the beginning of the lecture. p. 155.

GOOD DRINKING WATER.

The Best drinking water should contain above 1½ grains of organic matter per

End of 8th Lecture, 1870.
End of 17th Lecture on Alimentation, 17th of the Course 1871

* 6 gr. alum to a gallon; let it stand 24 hrs.

Tincture of chloride of Iron followed by
Carbonate of sodium is used sometimes also.

Carbonate of sodium will do —
like lime in action;
taking $CO_2$ making bicarbonate
of sodium —

End of 9th Lecture, 1873.

gallon. Even as high as 10 grains has been known to do no obvious harm. Habit perhaps makes us accustomed to it. (page 130).

PURIFICATION OF WATER.

The purification of water is a question of importance. Passing it through

TIN.

tin with holes in it is quite a good way. The tin has minimum effect, while the minute division separates much of the organic matter.

BOILING.

~~Boiling resit som lime.~~

ALUM.

If alum be added some organic matter will be precipitated.

LIME.

Hard water should be boiled, lime water being added. There is an excess of carbonic acid combined with the lime. When lime water is added the new lime unites with the carbonic acid forming a white precipitate. But the worst kind of hard water is not affected by this.

PERMANGANATE OF POTASSA.

Permanganate of potassa is also a purifier, and is used on a small scale.

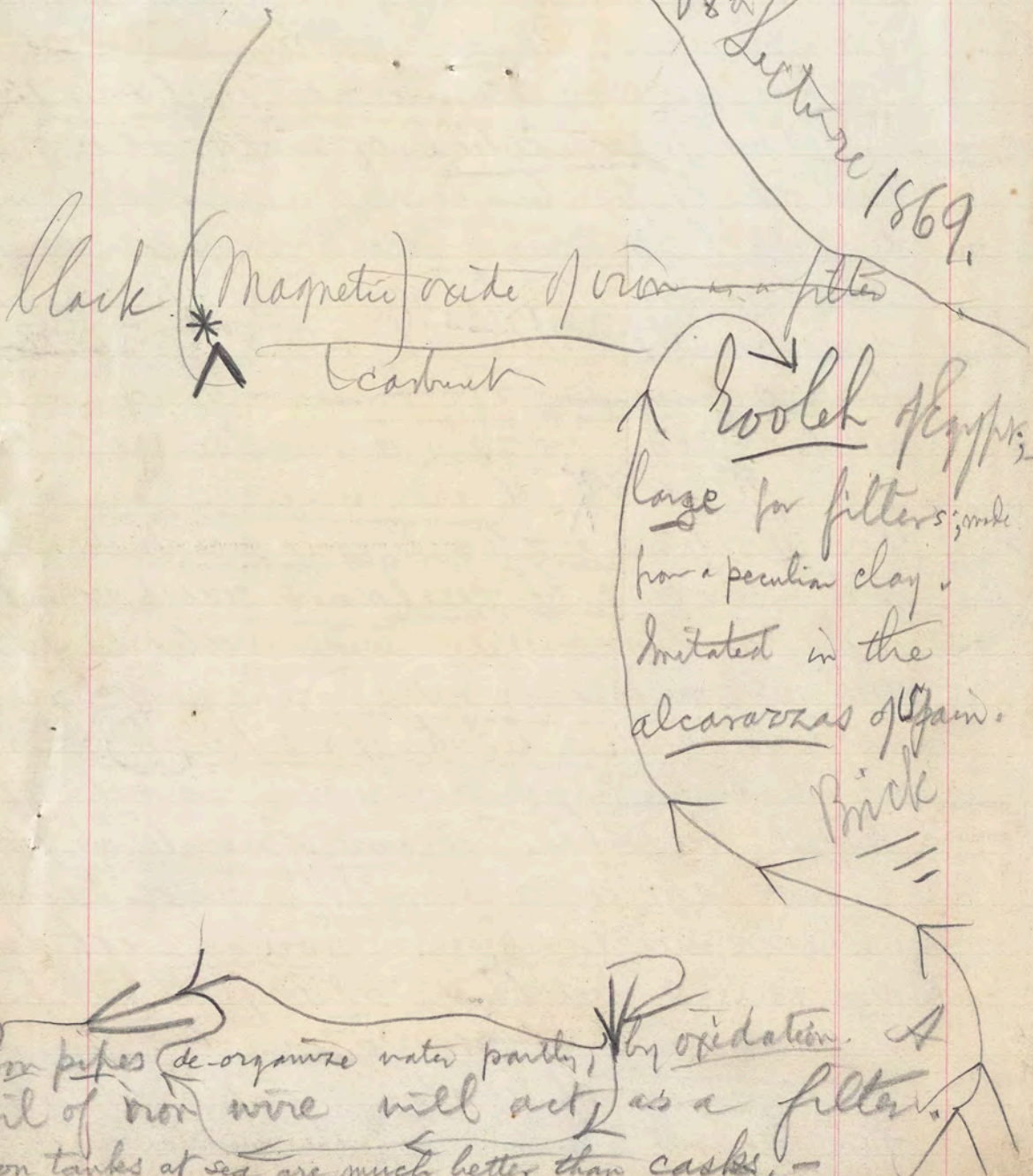
TANNIN.

Boiling with tannin is also adopted; also putting pieces of charcoal in the water.

CHARCOAL

Charring the lining of water-casks is often practised to make drinking water keep on voyages by Sea.

End of 18th Lecture 1869.



UTILITY OF THE WATER PEST PLANT.—The American water-plant, (*Elodea Canadensis*), which, under the name of Water Pest, has caused so much alarm in Europe by its rapid propagation in canals and streams, it is stated, serves a very important purpose as a purifier of water, especially in destroying the taste and smell of sewerage. It is admirably adapted, too, as a nutriment for young herbivorous fish, and as a refuge for young fish of any kind, and can be introduced to great advantage in fish-breeding establishments. It also furnishes an excellent manure for soils poor in lime and other inorganic constituents, as it contains an unusual per centage of lime, soda, potash, magnesia and silica. The separation of these ingredients from the water tends to purify it and render it much softer and more serviceable in domestic economy than otherwise. Indeed the plant will not thrive in water that does not contain lime, at least in an appreciable amount; and when planted in a pond, it dies out as soon as the water is brought to a condition of approximate freedom from mineral ingredients.

SPONGE.

WOOL.

RESERVOIRS.

MASONRY,
IRON,
ZINC,
LEAD.

COVERING

Chloral has been known since 1832, when M. Dr. Chapy, discovered it, in studying the action of lunatic, æt. 56, swallowed a fork, told of it, was not believed, till after some days a tumor was felt in the right iliac fossa, which increased in size, became red, with adherent skin; eventually bursting and giving issue to a large fork twenty days after it was swallowed; for fifty-five days air and débris of food came through the wound, which eventually healed up.

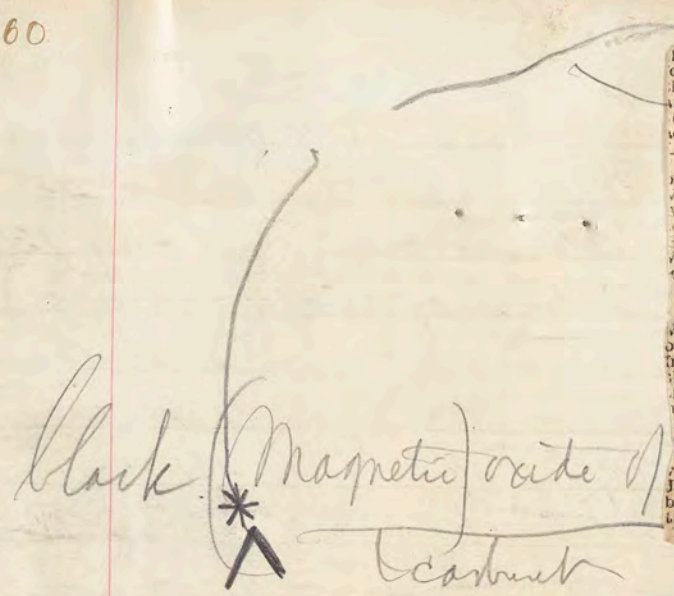
M. Dureau has written to the *Gazette Médicale* an

Dumas showed, some of... remarkable sub... of chloral, when brought into contact with alkalies and alkaline carbonates, was transformed into chloroform and formic acid. The question then arose, might not a similar change take place in it when introduced into the animal system, through action of alkalies in the blood, and thus chloroform be produced in the organs into which it entered? To test this theory Liebreich administered hydrate of chloral to some of the lower animals and to man. The physiological effects, similar, in some measure, to those produced by chloroform, seemed to favor the theory; still, the results obtained in these earlier experiments (which were repeated by other observers) did not always conform to expectation. Certain experimenters, differing from M. Liebreich's view, asserted that the action of chloral was one proper to itself, and quite independent of chloroform.

To reach a satisfactory conclusion, it was necessary, first of all, to be assured of the purity and identity of composition of the products employed in the experiments; and M. Personne soon satisfied himself that the samples of chloral varied much in degree of purity and composition. Having obtained a supply of pure chloral, he proceeded to investigate the transformations it undergoes in the system, in order to discover whether it produces chloroform. Some experimenters, as we have said, denied that the effects observed were due to chloroform. Animal blood, submitted to the action of hydrate of chloral, did not give any odor of chloroform; whereas this odor may be easily recognized where chloroform has been used in the same way. Moreover, if hydrate of chloral be added to blood which is newly taken from a vein, and kept in circumstances the most favorable, according to theory, for production of chloroform, still no odor of chloroform is observed. A decisive experiment was, therefore, necessary. Was it demonstrable that, notwithstanding the contrary appearances, chloroform was actually formed in the system after ingestion of chloral?

M. Personne proceeded as follows: He gave a dog (which was in good condition) 8 grammes of chloral. When the state of anæsthesia was nearly complete, he took from the jugular vein of the animal a quantity of blood in which to search for the presence of chloroform. He then passed a current of air through the blood (which was kept at a temperature of about 40° C.) and then through a red-hot tube, the further extremity of which was immersed in a solution of nitrate of silver. By this means, chloroform contained in the blood would be withdrawn, and decomposed by the heat, and the products of this ... dition passing into the nitrate of silver ... se a precipitate of chloride of silver, ... chlorine from the decomposed chloro... experiment, frequently repeated un-

160



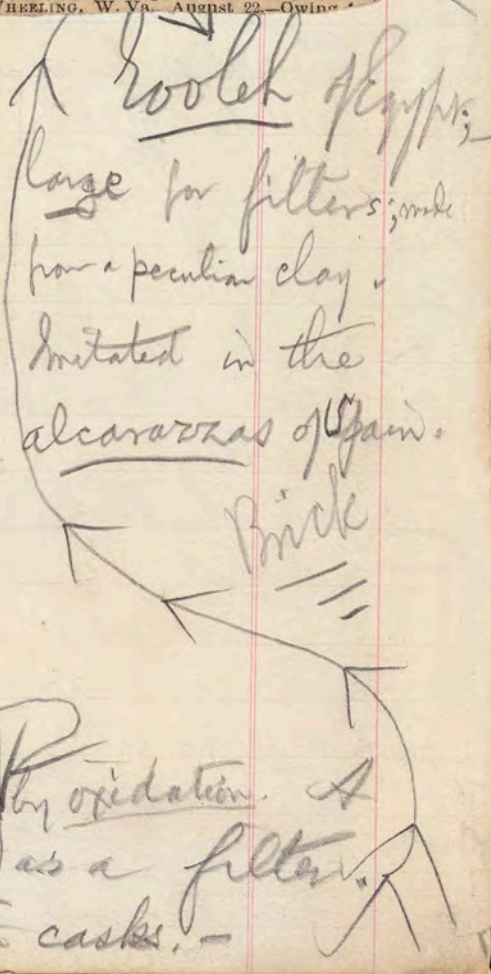

...hey had agreed to give the Liberals electors ...or seven districts and one elector at large, and ...he Lieutenant Governor, Secretary of State ...nd Register of Lands, the Democrats to have ...he remainder of the ticket. The report was ...dopted with a few dissenting votes from St. ...ouis delegates.

The following ticket was nominated: Judges ...f the Supreme Court, E. D. Ewing, H. M. ...oornies, F. A. Sherwood and Washington ...dams, all Democrats; Governor, Silas Wood-...on, Democrat, and Lieutenant Governor, C. ...I. Frost, Liberal; Secretary of State, E. F. ...W. Riegel, Liberal; Register of Lands, F. So-...omon, Liberal.

**The West Virginia Election.**

GREEN BRIAR, WHITE SULPHUR SPRINGS, W. Va., Aug. 22.—The election in this section of the State passed off quietly as far as heard from. A full vote was polled. In this town-...hip the majority is about 400 for Camden and ...he Constitution. This county (Green Briar) ...as evidently gone largely for Camden and ...he Constitution. Matthews, Democrat, for ...ttorney General, is largely ahead of his ...icket. The negroes, with few exceptions, ...oted solid against the Constitution, and for ...Jacobs, independent. The wires are down ...between New Richmond and Charleston, on ...the line of the Chesapeake and Ohio R. R.

WHEELING, W. Va., August 22.—Owing ...




Iron pipes (de-organize water partly, by oxidation. A coil of iron wire will act as a filter. Iron tanks at sea are much better than casks.—

FILTERING.

SAND, GRAVEL, & CHARCOAL.

An filter
layers; viz:
coal. Charcoa
the best when
Its effect is bot
ical. It absorbs
of filtration are
diagrams (page 15

EFFECT OF CHARCOAL.

Another
sponge instead
gets choked up
through wool d
There is no sup
fact they are not

SPONGE.

WOOL.

RESERVOIRS.

MASONRY, IRON, ZINC, LEAD.

Reservoirs fo
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cement & the be
are sometimes
especially the l

COVERING

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SPONGY iron is produced by calcining powdered iron ore with charcoal. Such iron forms a most excellent filter, more powerful, it is said, than even animal charcoal. It is said that even sewage-water filtered through a layer of this substance is completely purified, and will remain sweet for almost an indefinite time.—*The College Courant.*

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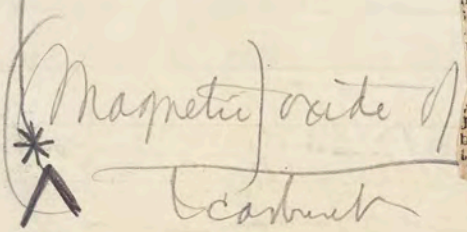


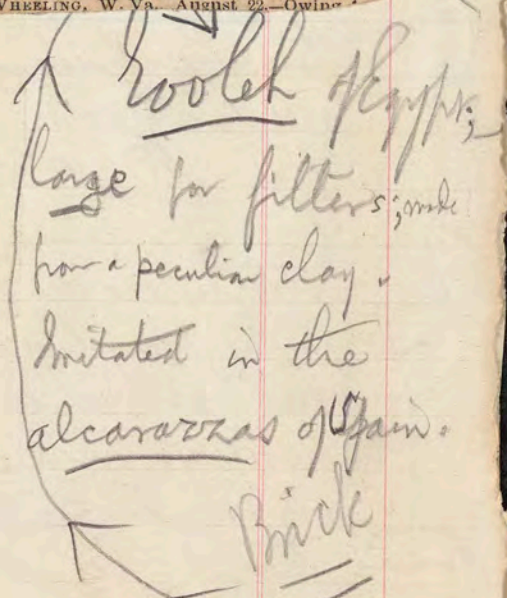


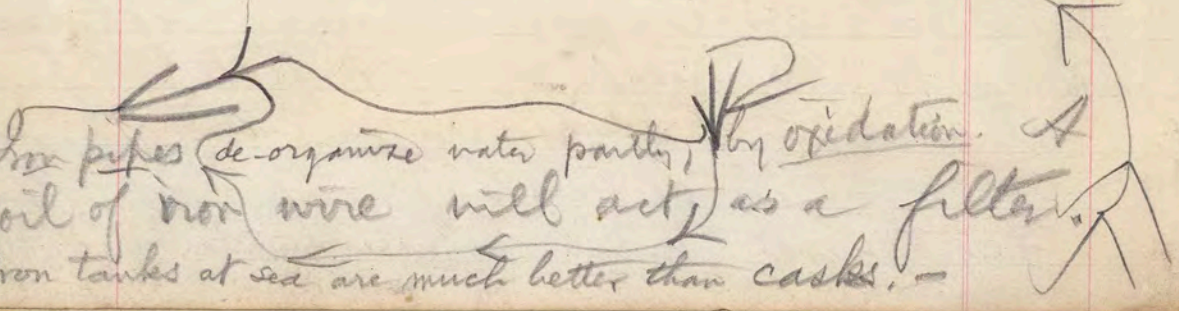

FILTERING.

SAND, GRAVEL, & CHARCOAL.

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diagram (page 15

EFFECT OF CHARCOAL.

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COVERING

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Chloral has been known since 1832, when M. Liebig discovered it, in studying the action of chlorine on alcohol, but till lately it had not been turned to any practical use. It was the remarkable physiological action of chloroform, and its similarity of composition to chloral, that called the attention of chemists and physiologists anew to the latter compound.

Dumas showed, some time ago, that hydrate of chloral, when brought into contact with alkalies and alkaline carbonates, was transformed into chloroform and formic acid. The question then arose, might not a similar change take place in it when introduced into the animal system, through action of alkalies in the blood, and thus chloroform be produced in the organs into which it entered? To test this theory Liebreich administered hydrate of chloral to some of the lower animals and to man. The physiological effects, similar, in some measure, to those produced by chloroform, seemed to favor the theory; still, the results obtained in these earlier experiments (which were repeated by other observers) did not always conform to expectation. Certain experimenters, differing from M. Liebreich's view, asserted that the action of chloral was one proper to itself, and quite independent of chloroform.

To reach a satisfactory conclusion, it was necessary, first of all, to be assured of the purity and identity of composition of the products employed in the experiments; and M. Personne soon satisfied himself that the samples of chloral varied much in degree of purity and composition. Having obtained a supply of pure chloral, he proceeded to investigate the transformations it undergoes in the system, in order to discover whether it produces chloroform. Some experimenters, as we have said, denied that the effects observed were due to chloroform. Animal blood, submitted to the action of hydrate of chloral, did not give any odor of chloroform; whereas this odor may be easily recognized where chloroform has been used in the same way. Moreover, if hydrate of chloral be added to blood which is newly taken from a vein, and kept in circumstances the most favorable, according to theory, for production of chloroform, still no odor of chloroform is observed. A decisive experiment was, therefore, necessary. Was it demonstrable that, notwithstanding the contrary appearances, chloroform was actually formed in the system after ingestion of chloral?

M. Personne proceeded as follows: He gave a dog (which was in good condition) 8 grammes of chloral. When the state of anæsthesia was nearly complete, he took from the jugular vein of the animal a quantity of blood in which to search for the presence of chloroform. He then passed a current of air through the blood (which was kept at a temperature of about 40° C.) and then through a red-hot tube, the further extremity of which was immersed in a solution of nitrate of silver. By this means, chloroform contained in the blood would be withdrawn, and decomposed by the heat, and the products of this decomposition passing into the nitrate of silver would cause a precipitate of chloride of silver, due to the chlorine from the decomposed chloro-

This experiment, frequently repeated un-

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## SEPARATION OF ORGANIC MATTER FROM WATER BY MEANS OF IRON.

FROM a paper by Mr. G. Michaelis, which we find reported in the *Medical Times*, we extract the following passage on this subject: —

"Professor Medlock was requested, in 1856, by the Amsterdam Water Company, in Holland, to analyze their water and to find the cause of the bad smell and fishy taste. The water in Amsterdam is let through iron pipes. Medlock received five samples of water for analysis, four of them from pipes in the city, and one before the water entered the reservoir of the company.

"In the water from the works before it came in contact with the iron reservoir and pipes, this chemist found 0.95 grains of iron, while in the other samples the iron was reduced to an unweighable trace: thus, instead of taking up iron from the service-pipes, it was not only diminished, but even all precipitated. Notwithstanding the almost entire precipitation of the iron actually in solution in the water which had passed the iron pipes, it formed an objectional red deposit on standing, while the water from the works before entering the pipes, holding in solution nearly one half grain of iron per gallon, formed no deposit. He examined the deposit chemically and microscopically, with the following result: On ignition the precipitate charred and was almost entirely consumed, showing that it consisted of organic matter; under the microscope the deposit was seen to consist of plants in various stages of decay; many of the fibres had even retained a perfectly organized structure. He remembered the important fact established by Schönbein, that copper and platinum can convert ammonia into nitrous acid, and he found that iron also transforms ammonia into nitrous acid, and by further investigation he found that strips of sheet iron, placed in water containing ammonia or organic matter capable of yielding it, act almost as quickly and well as the metal in a finely divided state.

"Now he made different analyses with water brought in contact with iron, and water in no contact with iron, and the result was, that while the water which was not brought in contact with iron contained 2.10 grains organic matter and 0.96 iron, the other contained only an unweighable trace of both, which showed plainly that the organic matter in the water was either decomposed or thrown down (rendered insoluble by contact with iron); and actually this water when filtered was clear, of good taste, had no smell, and was free from organic matter.

"All organic matter either contains nitrogen or is non-nitrogenous. The latter consists almost always of carbon, oxygen, and hydrogen, and is very quickly, as soon as it is no more under the vital influence, converted into carbonic acid and water. The nitrogenous matter is mostly of animal origin, and consists of nitrogen, oxygen, hydrogen, and very often sulphur and phosphorus, and is dissolved or suspended in water, very rapidly decomposed into gases very offensive to taste and smell, and undoubtedly very obnoxious. But all these are immediately destroyed by the presence of nitrous acid. Medlock proved, as before stated, by a series of subsequent analyses, that iron produces nitrous acid by its action on the nitrogenous organic matter, which is the most destructive power nature has. Muspratt calls it 'Nature's scavenger.' This chemist found as a general result that by allowing water to be in contact with a large surface of iron, in about forty-eight hours every trace of organic matter was either destroyed or rendered insoluble, in which state it could be purified effectually by filtration."

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### The West Virginia Election.

GREEN BRIAR, WHITE SULPHUR SPRINGS, W. Va., Aug. 22.—The election in this section of the State passed off quietly as far as heard from. A full vote was polled. In this township the majority is about 400 for Camden and the Constitution. This county (Green Briar) has evidently gone largely for Camden and the Constitution. Matthews, Democrat, for Attorney General, is largely ahead of his ticket. The negroes, with few exceptions, voted solid against the Constitution, and for Jacobs, independent. The wires are down between New Richmond and Charleston, on the line of the Chesapeake and Ohio R. R.

WHEELING, W. Va., August 22.—Owing

Woolen strips; large for filters; make from a peculiar clay. Imitated in the alcarazzas of Spain. Brick

By oxidation. A as a filter than casks.—

FILTERING.

SAND, GRAVEL, & CHARCOAL.

In filtering, the most natural arrangement is three layers; viz: gravel, sand, and charcoal. Charcoal, especially animal charcoal, is the best. when thickly

EFFECT OF CHARCOAL.

Its effect is both mechanical and chemical. It absorbs gases, etc. The effects of filtration are represented by diagrams (page 154.)

SPONGE.

Another mode of filtering is by means of a sponge instead of charcoal. The sponge gets choked up. Another mode is to filter through wool dyed with alum and tartar. There is no superiority in this mode, in fact they are not as good as charcoal.

WOOL.

RESERVOIRS.

Reservoirs for holding water are generally made of masonry, iron, zinc, or lead. Masonry cement is the best. Iron and zinc are sometimes used, but lead is not to be used, especially the latter.

MASONRY, IRON, ZINC, LEAD.

COVERING.

All reservoirs should be covered. Vegetation is a bad sign; it indicates too much stagnation in the water. It is said, however that certain plants, are even beneficial to the water. Protococcus & Chara oedizea & some "duckweeds" give acidity to the water and thus purify it.

# R.

## CENTS PER WEEK.

**he Austrian Press on the Conduct of the War.**

Vienna Correspondence of the London Times.]

The subjoined summary of an article which contained in the Ost Deutsche Post can hardly fail to be acceptable to you, as it fully confirms statements recently made by your special correspondent and myself:

"After his defeat at Koniggratz, the Commander-in-Chief of the Army of the North told the correspondents of the Vienna newspapers that they might write what they pleased, and of the permission given I will now take moderate advantage. It would have been very easy for Benedek to repulse the threadlike Prussian columns which entered Bohemia through the passes leading from Saxony, Silesia and Glatz. This he did not attempt to do because Saxony was not to be made the theatre of war, and his object was to effect a junction with the Bavarian and other Federal troops. As the Bavarian forces that had been promised did not make their appearance, Benedek resolved to act on the defensive and, if possible, to prevent a junction between the two armies which were opposed to him. Unfortunately, the strength and skill of the enemy had been as much underrated as our own prowess had been overrated. At the very opening of the campaign the Austrian Generals had occasion to remark that with the Prussians war is an art. Thousands of millions of florins have been spent on our army, but it has learned little or nothing of the modern art of warfare. Though it cannot be denied that some of the commanders of the corps committed grievous faults, the old-fashioned and most injudicious military system was the principal cause of our defeat. The needle-gun gives the Prussians a great advantage over us, and *the superior intelligence of their commanders is still greater.* The nation has been told that treachery and a remarkably complete system of *espionage* were the cause of our disasters. Treachery there has been none, and probably the spy system is less complete than is supposed. At the outbreak of the war many Prussian subjects either possessed or managed industrial establishments on this side of the frontier, and they were able to inform their friends at home of what was passing, as all the communications were left open. The inhabitants of the frontier districts offered to organize a Landsturm, for the purpose of keeping guard over the passes and defiles; but they were haughtily told that such matters did not concern civilians. On paper our army numbers 800,000 men, and rations are supplied for that number of soldiers, but it is a positive fact that Benedek had not 250,000 fighting men under his command. Where were the others? Were they, perhaps, at Custozza?

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## READY PURIFICATION OF WATER.

Blessed as we are in Philadelphia with an abundant supply of pure water, we can hardly appreciate the many inconveniences and annoyances, if not positive suffering, to which so many of the inhabitants of other places are subjected on account of the deficient supply and impurity of the water which they are compelled to drink and use for domestic purposes. It is not necessary, however, to go beyond our city limits to see privations of this nature, which are increased as we go further, and particularly in some otherwise desirable agricultural districts. For the benefit of the inhabitants of these places we proceed to describe a means for the ready and simple purification of water. It consists in filtering the water through the black oxide of iron, by which it is freed from nearly all its organic (microscopic animal and vegetable) impurities. Mr. Thomas Spencer, to whom the public seem to be indebted for the discovery of this fact, found that sands which contained the black or magnetic oxide of iron purified the water which was filtered through them, and that sands which did not contain this substance had no appreciable effect. This substance cannot be procured sufficiently cheap by the ordinary process for its manufacture, Mr. Spencer obtains it by heating together hematite, or red oxide of iron (red ochre), with sawdust. The oxide, as made by this process, contains a small percentage of carbon, which renders the substance harder and less brittle. In the state in which it is used it is in the form of coarse black grains, which are strongly attracted by the magnet. Its commercial name is magnetic carbide.

Now, if even the more impure kinds of river water are made to pass through a layer of magnetic carbide four or five inches thick, it is not only filtered, as it would be by passing through a similar layer of gravel or sand, but *it is deprived of much of its soluble organic impurities.* Not only is the water, such as that supplied by the London companies, which has passed through the filter remarkably bright, but it is found to have lost its previous yellowish color, and to be free from smell or taste of any kind.

Lastly, the crowning property of the black oxide of iron or magnetic carbide is that it suffers no perceptible diminution of its power by time and use. In the waterworks at Southport, in Lancaster, England, it has been in use for seven years, without showing any diminution of power, and in domestic filters, in use for the same period, the same result is obtained, although the purifiers have not once been cleansed or refitted.

both, which showed plainly that the organic matter in the water was either decomposed or thrown down (rendered insoluble by contact with iron); and actually this water when filtered was clear, of good taste, had no smell, and was free from organic matter.

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WHEELING, W. Va., August 22.—Owing

Woolen flannels; large for filters, made from a peculiar clay. Imitated in the alcarazzas of Spain. Pride

By oxidation. As a filter. than casks.—

FILTERING.

SAND, GRAVEL, & CHARCOAL.

In filtering, the most effectual arrangement is with ~~there are often~~ three layers; viz: gravel, sand, and charcoal. Charcoal (especially animal) is the best when thickly packed in layers. Its effect is both mechanical and chemical. It absorbs gas & ~~Two common ways of filtration are represented in the annexed diagrams (page 154.)~~ Let the water first flow upward through the filter.

EFFECT OF CHARCOAL.

SPONGE.

Another mode of filtering is to use sponge instead of charcoal, but it soon gets choked up. Another way is to pass it

WOOL.

through wool dyed with tincture of galls. There is no superiority in these modes, in fact they are not as good as the others.

RESERVOIRS.

Reservoirs for holding water are generally made of masonry. Slate, stone, or cement are the best. Iron, zinc and lead are sometimes used, but ~~require caution~~ especially the latter, two great evils; especially the lead.

MASONRY, IRON, ZINC, LEAD.

COVERING

All reservoirs should be covered. Vegetation is a bad sign; it shows there is too much stagnation in the water. It is said, however that certain plants, are ~~good for~~ even beneficial to the water. Protococcus & Chara oxidize

Some "duckponds" give acridity to the water on which they grow.

of Hr Rep. 1869) thinks at least one case of lead poisoning has come to his knowledge in New York, from drinking water habitually when first drawn from a lead pipe after standing all night.

Dr Chandler (Metr. B. of H. Rep. 1869) thinks at least one case of lead poisoning has come to his knowledge in New York, from drinking water habitually when first drawn from a lead pipe after standing all night.

Wells in the country often have leaden pipes connected with rotary or other pumps. In such cases, the pipe ought first to be emptied before water is drawn for use.

Elizabeth Summers Case of Chr.

(Clendenin west

7 & 8 Escape or surplus pipe 7 — Drain pipe 8

RESERVOIRS SHOULD HAVE NO CONNECTION WITH SEWERS.

An important thing in a reservoir is to have no communication with a sewer. Serious injury has been done to water by the gases emanating from them. The correct plan is to have the outlet open over a grate so as to separate at some distance from the sewer.

WATER PIPES.

IRON, LEAD, BLOCK-TIN, POTTERY.

For conveying water, pipes are made of iron, lead, block-tin, and a kind of pottery. There is no objection to iron. Block-tin is excellent but is too expensive. Lead is the most desirable. It often causes injury. Rain water which has gone over a leaden roof has done injury. When Louis Phillippe was in Philadelphia, his family was poisoned by water. It contained 7/10 of a grain of lead per gallon. 1/100 is injurious to some, and 1/10 to everybody.

LEAD POISON.

LOUIS PHILLIPE.

EDINBURGH.

In Edinburgh the water contains 1/140 of a grain. There is no poisoning in Philadelphia although we use leaden pipes. Coating with carbonate of lead prevents any bad effect. If the water has much carbonic acid in it, as the Schuylkill has,

COATING OR CARB. OF LEAD.

164 * Galvanized iron pipes are injurious; the Zinc
is somewhat poisonous, and when two metals are together a
Galvano chemical reaction occurs increasing the amount dissolved.
Boston Journal of Chemistry, 1871 gives much [illegible] on this subject.

For Mineral Waters, refer to the
Course of Professor Geology & Mineralogy

End of 9th Lecture 1867
8th " 1868!

alkali flats!

Alkaline waters (with soda) Hard
line of Pacific Railroad, some waters there
Not drinkable [illegible]
the best Waters
Rain water

this coating will be formed, provided the water rests for a time in the pipes. The carbonic acid unites with the lead. Water which has very little foreign saline matter should not go through leaden pipes. Charcoal helps to protect if you put a little phosphate of lime to it. Animal charcoal holds combined phosphates.

ANGLES IN THE PIPES.

The danger is increased if there are sudden turns in the pipes.

ANIMAL MATTER IN WATER

Water impure from excess of animal or vegetable matter such as graveyard water, is very bad. Vegetable matter also renders it bad. Heavy salts, as sulphate of lime & magnesia, nitrates and nitrites, and chlorate of lime are injurious.

DYSPEPSIA AND DIARRHŒA.

Dyspepsia and diarrhœa are caused by these waters, especially in limestone regions. The waters of the Mississippi, Kansas, Rio Grande, & Ganges, cause the latter in strangers. In Ohio the same thing occurs. The protection against it is to add some stimulant as brandy, in very small quantity. Organic matter is always found in the wells of cities. Rain water is never good. Formerly it was recommended to keep aspirators in city houses.

CITY PUMPS.

Rain water may be used to advantage in such regions.

A single pump in London has the reputation of having caused the death of 600 people, in a cholera season.

PUMP NEAR THE STATE HOUSE.

There was a pump near the state house, whose water was supposed to have medicinal qualities. It was resorted to by large numbers of people until by accident, it was discovered that it had connection with a privy.

SULPHURETTED HYDROGEN.

Another cause of impurity is sulphuretted hydrogen. The French in Mexico suffered diarrhoea from this cause.

EXHALATIONS FROM SEWERS.

Exhalations from sewers are another cause. There is hardly any doubt that the poisoning in the National Hotel in Washington was caused in this way. A sewer ran right under the building and at the time there was a leakage.

NATIONAL HOTEL OF WASHINGTON. 1857

DISSOLVED MINERAL MATTER.

Dissolved mineral matter causes diarrhoea. Brackish water at the sea often, as at Cape May, causes

DYSENTERY.

Dysentery is also caused by a want of pure non-brackish water. E. Indies & W. Africa.

ACCLIMATION.

Acclimation prevents these as it does malaria — acting on a race, if not individuals.

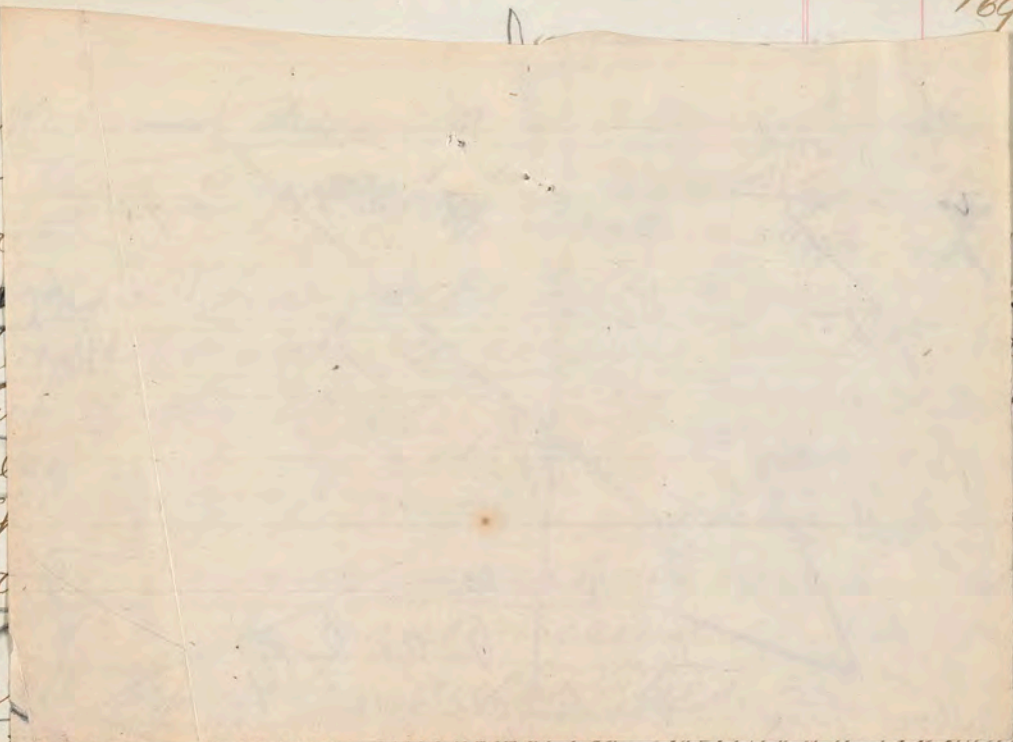
See Etiology (Typhoid Fever).

Dr Flint's instance:

In a village in New England with a few families — 9? — making 40? individuals, — a stranger arrived at the inn. He was very soon down with Typhoid fever. After his case followed a number of others — there having been no typhoid fever in the neighborhood for a long time before. Some cases occurred in every family in the village but one. That family had quarreled with the landlord of the inn, and used water from a well of their own: all the rest of the inhabitants of the village drank the water of the tavern pump. —

MALARIA.

TYPHOID.



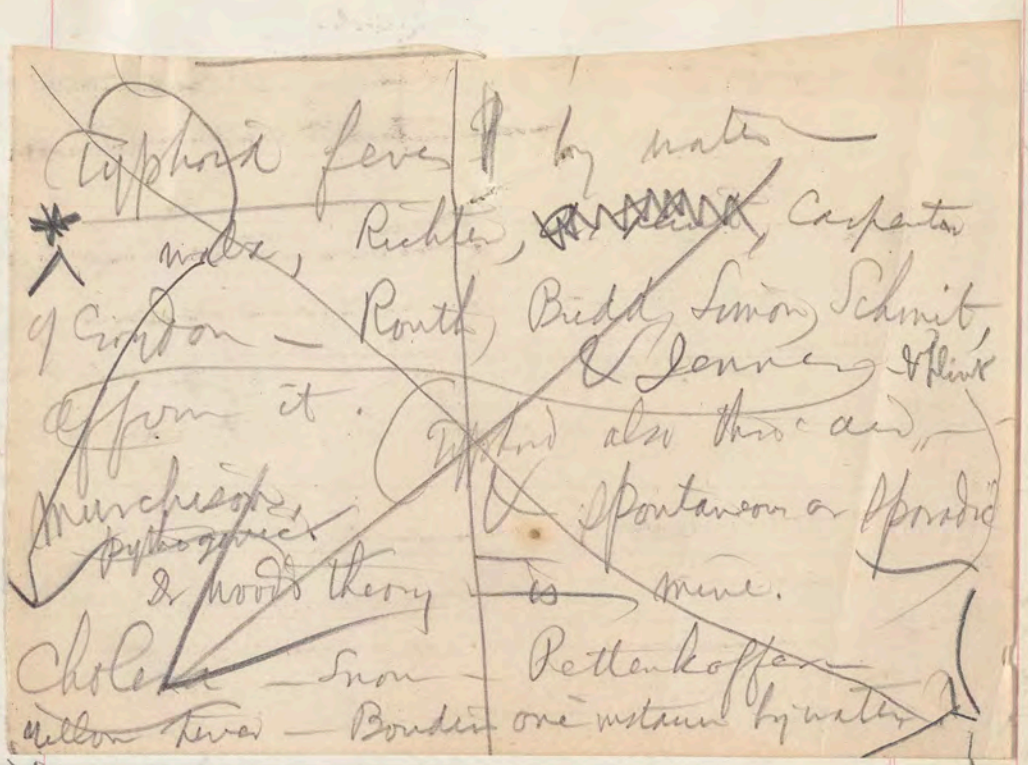
believe. Many European writers assert it, and in this country Dr. Flint. But, with Prof. Wood, I am unable to think that typhoid ~~it~~ caused by water. It is a constitutional disease not depending on communication, found in all sorts of localities.

CHOLERA & YELLOW FEVER.

Cholera and yellow fever, as being caused by impure water, will be taken up hereafter.

DISEASES OF THE SKIN.

Diseases of the skin, such as boils, may be generated by impurity of the blood, caused by impurity of water.

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MALARIA.

Malarial diseases have in one instance at least, are said to be caused by water. The case is related by Boudin. Three ships left Algiers for Marseilles with 800 soldiers on board. Two of the ships arrived without sickness but the other, the Argo, had of 120 men 111 cases. This ship had been supplied with water from a marsh.

TYPHOID.

As to the transmission of typhoid fever by water, authorities are unsettled. Many European writers assert it* and in this country Dr Flint. But, with Prof. Wood, I am unable to think that typhoid fever is caused by water. It is a constitutional disease not depending on communication, found in all sorts of localities.

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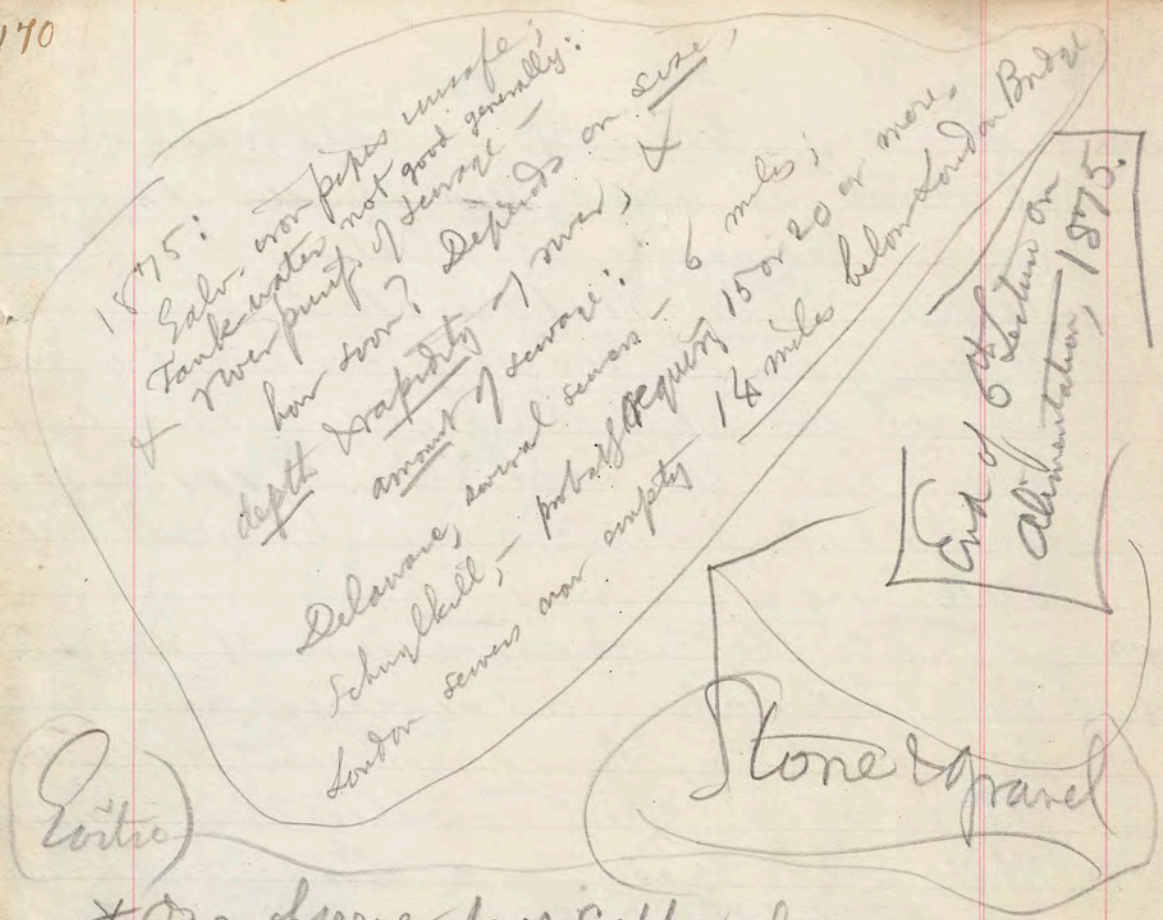


*One observer says copper also.

Ice!!

Seasoning
Food;
Pepper, mustard, Spices;
stimulating, condiments.

IMPURE ICE AND INTESTINAL DISORDER.—Dr. A. H. Nichols, of Boston (*Seventh Annual Report of the Massachusetts State Board of Health*), gives a very interesting account of an outbreak of an intestinal disorder in a large hotel at Rye Beach, N. H., due to the contamination of the drinking-water by ice cut from a foul and stagnant pond in the neighborhood.